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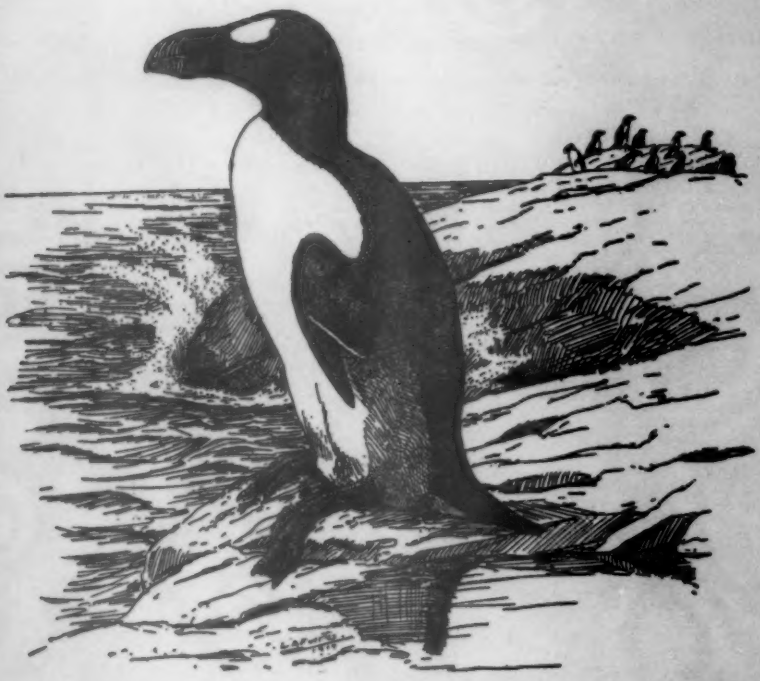

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(*Left*) "BURITISAL" ON THE RIO DAS MORTES, MATO GROSSO, BRAZIL. ATTENTION IS CALLED TO THE PENDENT, DRY FRONDS OF THE BURITI PALM WHICH SERVE *Reinarda* FOR SLEEPING QUARTERS AND NEST-BUILDING. (*Right*) NEST OF *Reinarda squamata* ON A DRY BURITI LEAF.

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THE NESTING OF *REINARDA SQUAMATA* (CASSIN)

BY HELMUT SICK

Plate 6

ALTHOUGH the Fork-tailed Swift is widely distributed in the northern and middle parts of South America, apparently nothing has been published to date about its nest-building. The only ecological reference known to me is in a paper by Gyldenstolpe (1945), who, from data supplied by A. M. Olalla, writes: "The fork-tailed palmswift roosts among the withered fronds of the 'burity' palms (*Mauritia vinifera* or *M. flexuosa*)."

In September and October, 1946, I had an opportunity to become acquainted with the nest of *Reinarda* on the Rio das Mortes in Mato Grosso, Brazil. The Fundação Brasil Central, for which I was studying various problems of natural science, generously arranged my stay in this very little-explored section of the country.

1. *Position and attachment of the nest.*

September 27, 1946, I observed a *Reinarda* building a nest in a 'buritisal' (grove of buritĺ palms) on the right bank of the Rio das Mortes. The nest was being constructed in a dry buritĺ leaf and was recovered there one month later. The stalk of the fresh leaf points obliquely up towards the sky; when withering, the leaf cracks at the base and remains hanging vertically near the trunk of the palm—a phenomenon frequent among palms. The buritĺ grows freely; its form is hardly less noble than that of the royal palm. The 'buritisal' is one of the most characteristic forms of landscape in central Brazil.

The nest-bearing fan of the palm leaf—without stalk—has an extension of 1.60 meters. It forms three large folds. Under the protection of the middle, most deeply folded part, the nest is situated, 16 cm. distant from the base of the leaf fan. It is attached to the mor-

FRONDS OF THE BURITI PALM WHICH SERVE *Reinarda* FOR SLEEPING QUARTERS AND NEST-BUILDING. *Reinarda squamata* ON A DRY BURITI LEAF.

phologically upper side of the leaf, which becomes the outer side and is turned away from the trunk when the leaf hangs down vertically. The structure is well hidden by the leaf sheath that folds toward the middle of the leaf; it hangs as in an umbrella three-quarters closed. Even the observer standing vertically underneath has difficulty in recognizing something within the dark folds of the leaf. The photographs (Plate 6) were taken with the leaf unfolded.

2. *Construction of the nest; eggs.*

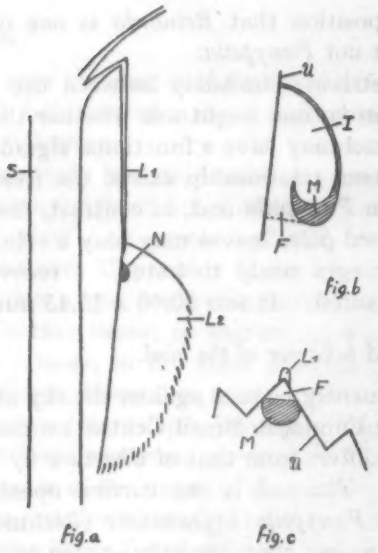
The nest has the aspect of a disorderly, elongated clump of feathers; the first impression is that of a solid mass. It is actually a thin-walled sac, ingeniously constructed, pasted laterally, with an entrance from below. The use of mucus plays a decisive part in the building of the nest with this swift as with others.

The egg shelf is attached to the inner side on the bottom of the wall, which points outward; there the nest has its largest width and depth, approximately 6–7 cm. in diameter. The egg shelf, itself, is a quite roomy trough of about 3.5 cm. diameter and about 1.5 cm. depth. The entrance to the sac, about 3 cm. wide, is opposite the egg shelf. The feathery structure, tapering off toward the top, measures about 13 cm. from entrance to the closed top of the nest.

The material used for the construction of the nest consists principally of fresh body feathers, basally rich in downs, of middle-sized birds, especially pigeons. The feathers are not worked feltlike into a uniform surface as is done by *Panyptila* (*see* below), but are only pasted, piece by piece. Cotton from plant seeds serves as a kind of binding material and a cover for the walls. Downy elements predominate in the interior. The walls are generally up to .5 cm. thick; only under the egg shelf one measures up to 2 cm.

The nest of *Reinarda* exhibiting this type of construction strikingly resembles the closed felt nest of *Panyptila*, to which no parallel structure has been known with certainty up to date. The principal difference between the nest of *Panyptila* and that of *Reinarda* is in the presence of a flight tunnel, added to the nest chamber under the egg shelf. The complicated nest of *Panyptila cayennensis* has recently been analyzed by the author (1947). The somewhat intricate terminology of the various parts of the nest was discussed in this publication; also the question was debated critically, whether the construction of a closed felt nest has been recorded also for a *Chaetura* (Euler, 1900; Goeldi, 1898).

The most important part of the nest—the egg shelf—of *Panyptila* was the theme of a comprehensive discussion. It varies in size a good



TEXT-FIGURE 1. Nest of *Reinarda squamata*.

Fig. a: Dry leaf of the "buritî" with natural connections and nest of Reinarda.
Fig. b: Longitudinal section of nest.
Fig. c: Cross section of nest.
Explanation of lettering: I, nest chamber; F, entrance to nest chamber; L 1, cracked stalk of leaf; L 2, fibres of leaf fan hanging down; M, nest trough or egg shelf; N, nest; S, trunk of the "buritî" palm; U, upper side of leaf to which nest is attached.

deal, apparently depending upon the varying orientation of the nest in space. One may ask whether, perhaps, the eggs are pasted on, as can be affirmed apparently for *Cypsiurus battassiensis, Cypsiurus parvus*, and *Hemiprocne mystacea* (Stresemann, 1927–1934; v. Boxberger, 1910; Meyer, 1928). I am unable to answer the question, although I found the nest of *Reinarda* with the eggs, because the eggs had been damaged. I had the impression, however, that the eggs were more firmly attached to the shelf than if due simply to the contents of the damaged eggs. Pasting of the eggs may be a safeguard for the conservation of the eggs—even taking into consideration the spaciousness of the egg trough—once one has seen the extent to which the dry palm leaves are jerked about by the wind. The above-mentioned species of *Cypsiurus* and *Hemiprocne* are also types with unsteady attachment of the nest to leaves of palms and small branches. This is in contrast to *Panyptila* which selects a firm foundation for attachment—trunks or strong branches, beams, or stone. These facts

strengthen the supposition that *Reinarda* is one of the swifts that paste their eggs, but not *Panyptila*.

Considering the striking similarity between the nest-chambers of *Panyptila* and *Reinarda*, one might ask whether the presence or absence of a flight tunnel may have a functional significance. Provided that such a conditional relationship exists, the free, laterally unprotected attachment in *Panyptila* and, in contrast, the enclosure within the more or less closed palm leaves may play a rôle.

There were three eggs ready to hatch. I recovered only one in condition to be measured. It was 10.00 x 15.45 mm.

3. *Appearance and behavior of the bird.*

Reinarda can frequently be seen against the sky at Chavantina, the camping post of the Fundação Brasil Central on the Rio das Mortes. Its flight silhouette differs from that of *Chaetura* by the long tail; it is also more delicate. The tail is not carried openly bifurcated but pointed, as also in *Panyptila cayennensis* (Richmond, 1898). The voice of *Reinarda* is no less characteristic—a thin screech on an E overtone, like *gs-gs*.

I saw the Fork-tailed Palm Swift, sociable like all swifts, approach the nest under construction mostly in company, then disappear alone among the leaves. It is my impression that the nest was practically finished when first encountered. I saw the bird working on the outside of the feather clump without recognizing details within the dark leaf folds. Each visit of the bird to the nest lasted five, ten and even fifteen minutes on September 27.

During the succeeding weeks I failed to observe the *Reinarda* at the nest. October 21, at night, I went to the 'buritisal.' In the glare of my flashlight I saw a bird clinging underneath the nest. A thunderstorm was approaching and the dry buritĺ leaves were hurled back and forth by the gusts of wind to such a degree that I feared any minute the stalk might be torn from the trunk. I decided therefore to shoot the bird clinging underneath the nest, realizing that damage to the nest and its suspected contents could not be prevented. Even before the dead bird (a male) fell, its mate flew out from the nest. The nest was not visibly damaged by the fine shot—selected especially small—but unfortunately the eggs were.

In the same 'buritisal' I found a second *Reinarda* nest, half destroyed, probably left from the previous breeding season. In November, 1946, in two other 'buritisals' on the Rio das Mortes, I saw a *Reinarda* flying into the leaves of 'buritĺ,' apparently feeding; further observations however, had to be postponed for a later occasion.

4. *Descriptive notes.*

The male shot near the nest is the only specimen of the species in my collection. A full discussion is, therefore, not possible. I may mention only the following:

The Museu Nacional, Rio de Janeiro, contains a specimen from western Mato Grosso (without sex, Comissão Rondon, Comemoração de Floriano, July, 1909). It agrees well with my specimen which is characterized as follows: Upper side bluish black with a green gloss, and with light feather edges; lower side dark on account of the extensive dark brown feather bases; no marked pectoral band.

There are, furthermore, in the same museum two specimens from Pará (♂, Monte Alegre, December, 1916; ♀, Rio Mojú, December 17, 1915) and one ♀ from Ceará (Ipú, June 16, 1910)—all labeled by E. Snethlage. These three specimens do not correspond with my specimen either in the color of the upper or under parts or the sides. The same applies to the females which Gyldenstolpe (1945) described from Manaos and from the River Juruá, adding: "more material is however needed to determine the constancy of these variations." The specimens collected by Lima near Coxim (Mato Grosso) (Pinto, 1940) are not at my disposal at the moment.

SUMMARY

Description and illustration of the nest of *Reinarda squamata*, encountered on the Rio das Mortes, Mato Grosso, Brazil. The nest is built in the leaves of the 'buritĭ' palm and its construction is analogous to that of the nest of *Panyptila cayennensis* and *P. sanctihieronymi*. Measurements of the egg are given. Flight silhouette and voice of the adult bird are noted. Short remarks on coloration are added.

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TWO DAYS WITH A WREN FAMILY

BY MINNA ANTHONY COMMON

The nest was in a coconut shell hung six feet up in a plum tree. I stood facing the entrance at a distance of three feet so that I might see the food as it was brought. The wrens were used to our close approach. With three intermissions, the position was kept up from 5:30 A. M. to 6:17 P. M. on one day. Two days later the same procedure was repeated for three hours, and that was when the young left the home.

JUNE 2: 5:30 A. M.—The female brought a small grasshopper and entered the nest with no hesitancy.

5:34.—The male brought an inch-long tent caterpillar and clung to the outside of the nest; the young put out their bills to receive the food.

5:35.—The female brought a grasshopper (one inch in length) from a southerly direction. I heard a sound in the nest like the waving of wings. The nest rocked all the time from the movement within. I could see four bills at the entrance.

5:35.—The male wren drove away a sparrow that came within twenty feet of the nest.

5:40.—The female wren drove away a Red-eyed Vireo, then brought food. Pleasant chirping issued from the nest.

5:45.—The female brought a grasshopper; removed excrement. She went some distance away. All was quiet in the nest for two minutes, then I heard wing flutterings.

5:49.—The male brought a one-inch grasshopper. A Cowbird was perched in the nest tree, but the wren paid no heed. It glanced at me but fed from outside the entrance hole as usual.

5:50.—The female brought a small miller and removed excrement. The male was hunting through snowberry bushes near by and scolding at a Yellow Warbler.

5:54.—The male brought a small moth and then left for a more distant search.

5:56.—The male returned with a large grasshopper held by one leg. He poked it into the nest door, looked in a second, reached in for the grasshopper—now headless—put it in again, stuck his head inside, looked at me suspiciously and left at 5:59. An instant later he gave me a good scolding—a furious one—from the overhanging maple.

6:00.—The female brought a worm from behind me; the male had flown away in front of me.

* * * * *

9:17; 9:19; 9:27.—Nestlings fed by the female; much nest noise. A Yellow Warbler came with the wren, watched her go into the nest and seemed to listen.

9:31.—Female brought a green worm.

9:32.—Female brought a miller.

9:33.—The male brought a big miller. He flew twice over my head before entering the nest; he really went inside this time.

9:36; 9:40; 9:42; 9:45; 9:47; 9:50.—The female fed the young all these times. Each time she went directly to the apple tree and brought a small green worm. The last time she went to a rose bush.

9:51.—The male brought a green worm; he put his head in the door to feed the young.

9:53.—The female flew into the hole without pausing on the branch or side.

9:56; 9:58; 10:01.—Young were fed by the female—once a worm; nest quiet.

10:04.—The male brought a miller.

10:06.—The female brought a mosquito.

10:09.—The male brought a large (1½ inch) brown caterpillar.

* * * * *

12:42 P. M. (temp. 80° F.).—The young were fed by the female. Much chirping in the nest.

12:47.—Young fed. The mother went into the nest and stayed. Quiet reigned.

12:58.—A coaxing noise from the nest which became steadily stronger; no feeding. Finally at 1:05 the noise ceased. It rained lightly. At 1:25 there was again much noise, but sleepy-sounding.

The mother came out of the nest. She stayed in a honeysuckle bush near by, eating.

1:28.—The female brought a 1½-inch hairy caterpillar, limp and dark; it looked like a tent caterpillar. She removed excrement.

1:32.—The female brought a small, smooth, green worm and removed excrement.

1:35.—The female brought a good-sized miller, dead and crumpled. Then she flew away. The young were quiet.

1:38; 1:39.—The female came and entered the nest rapidly. It was still raining lightly. She remained in the nest and all was quiet. At 1:46 there was considerable chirping; the mother was still inside. Quiet at 1:55.

2:02.—The male came with a fat, white grub one inch long and went into the nest; much noise ensued and then it was again quiet. He left in one minute; the female was still inside.

2:05.—Male brought a small moth and fed it from the door. The female flew out. For five minutes there was much noise in the nest; no feeding.

2:12.—Female brought a small insect. At 2:15 three bills showed out of the door.

2:20.—Female brought a miller; removed excrement.

2:21.—Male brought a small white moth.

2:22.—Male brought a small fly. One youngster reached out of the door to seize it. At 2:23 three bills were protruding. At 2:25 three heads were outside, 'yipping.'

2:26.—Female brought a butterfly and fed it by bits from outside to the three young.

2:27.—Female brought a small fly.

2:28.—Female with a green worm. The nest was rocking wildly from the movements inside.

2:29.—Female with an insect.

2:30.—The male brought a horsefly. There was loud chirping and the nest rocked.

2:31.—Female with a large black insect.

2:31.5.—Female with another black insect.

2:32.—Male with a yellow moth. One young had its head out and there was very loud 'yipping.'

2:34.—Female with a very large moth brought from a distant apple tree.

2:38.—Female with a dark moth.

2:39.—Female with a large, furry, yellow fly.

2:40.—Female with a small black beetle.

2:42.—Female with a black moth.

2:43.—Female with a small insect. There was much wing-beating inside the nest.

2:45.—Male brought a caterpillar. There were three open mouths at the door and much noise.

2:46.—Female with a small fly.

2:46.5.—Female with a green caterpillar.

2:47.—Female with a spider. Two heads popped out of the door as the mother left.

2:54.—Male brought a black fly; part was given to two birds from outside.

2:55.—Female with a worm. The wren then flew to a weed patch.

2:57.—Female with a small insect. The wren flew to a snowberry, then to an elm. There was much 'yipping.'

3:02.—Female with a small insect. The wren flew to an apple tree.

3:03; 3:04; 3:05; 3:07; 3:13; 3:14; 3:17.—Female brought flies, moths, and other small insects, alternately.

3:19.—Female with a small insect. Excrement removed; much 'yipping.'

3:20; 3:21; 3:22.—Female with flies and small insects. A great deal of noise was heard in the nest.

3:23.—Male came with nothing in his bill and hopped about the nest tree, and at once the young stopped crying. Then the female brought a worm, fed the babies and chased the male away.

3:25.—The male followed the female which fed a worm, then chased him away.

3:27; 3:29; 3:40.—Same performance repeated. A worm each time.

3:45.—Female with a small insect.

3:46.—Female with a big brown butterfly. She had much difficulty getting it in the door.

3:50.—Female with another butterfly, a monarch.

3:51.—Female with a daddy-long-legs.

3:52.—Female with a green worm.

3:53.—Male brought a large underwing moth.

3:55.—Female with a large, dark moth.

* * * * *

6:04.—Female with a small insect; excrement removed.

6:17.—Female with a large grasshopper. She went into the nest and did not come out again before dark. All was quiet. The male was nowhere in sight.

Two days later we took our stand in the same place at 7:20 A. M. and had the rare good fortune to witness the young leaving the nest for good.

JUNE 4: 7:20 A. M.—The male brought an insect and scolded.

7:23.—Female brought a small worm, looked me over carefully and scolded.

7:23.5.—Male brought something; I did not see what it was.

7:24.—Female with a small white moth.

7:25.—Female with a small, brown miller.

7:26.—Female with a large, dark brown moth. She went inside and stayed there.

7:27.—The male came and stopped to sing with a small worm dangling from his bill. He fed from outside.

7:31.—The female looked out of the door. The male sang in a neighboring plum tree. Then she carried out excrement and dropped it from the door but stayed inside.

7:34.—Female had her head out. The male sang from a honeysuckle bush. She went back inside.

7:37.—Female put out her head. The male sang from a butternut and a plum. She went back inside.

7:38.—Male chattered and scolded at another wren in the plum. It was one of the babies! Male fed it at 7:40; 7:45; 7:46, singing most of the time.

7:49.—Female finally came out; a young one looked out. A grackle came into the apple tree. All was silent.

7:50–7:56.—Young still looking out of the door. The young in the tree was teasing; male singing near by. Then the young tried to fly but dropped to the ground. Male very distressed; he coaxed it to follow him into the vines on the fence.

8:04.—The young hidden in the low rose bushes was fed by the male.

8:06.—Male fed the young in the bush. Much crying issued from the nest; one head out.

8:10; 8:11; 8:12.—Both adults fed the young in the rose bush. There was not a sound of wrens anywhere.

8:20.—A young rat came sneaking along under the shrubbery and passed the foot of the nest tree. The young looked out at it. Male came and scolded hard.

8:22.—Male was singing in the apple tree. The young in the nest were begging.

8:23.—Female brought an insect and removed excrement, carrying it 12 feet.

8:24.—Female came and looked me over closely. She had no food in her bill. She removed excrement and took it in the opposite direction, 12 feet away.

8:25.—Female fed the young in nest.

8:26.—Male fed them a mosquito from the outside.

8:28.—The rosebush youngster flew across the garden out of range of vision, but could be heard teasing. All was quiet inside the nest.

8:29.—Female fed a good-sized brown miller, then scolded in the butternut tree.

8:30.—Male sang on the fence.

8:32.—Female brought a large, brown worm and removed excrement.

8:39.—The young came flapping back to the rosebushes. The female fed it there at 8:40 and 8:41.

8:41.5.—Three young looked out of the nest, crying. The male sang on the fence.

8:42.—Another young left the nest and flew into the honeysuckle with much chattering.

8:45.—Another baby looked out.

8:46.—A third young went into the rosebushes followed by the female. Two young peered out of the nest door. One came outside. There was no noise. An oriole alighted on the fence beside the rosebushes; no sound from the wrens.

8:55.—The last young left the nest and flew to the fence (3 feet) and perched on the wire. It lost its balance and turned a complete somersault to its original position.

8:59.—The young still sat there, 'yipping.'

9:00.—Lost balance again and again; another somersault.

9:10.—Young finally fell into the honeysuckle bush, still 'yipping.' There was no answer from the adults.

After that day the garden was quite deserted by the wrens.

SUMMARY

A wren nest built in a coconut shell which hung five feet from the ground in a plum tree was watched closely for about five hours on June 2 and again for two hours two days later.

During that time the male brought food 38 times and the female 78 times. His contributions were noticeably larger than hers and were fed through the door from the outside. He was seen to enter the nest but twice. The female attended to the nest sanitation. The young left suddenly within a few hours of each other, simply flying out and alighting ten to twenty feet away. They were cared for in the near-by bushes for less than a day and then deserted the neighborhood and were seen no more.

Watertown
New York

BIRDS IN AN ARMY CAMP

BY LIEUTENANT VINCENT P. McLAUGHLIN, JR.

OCCASIONALLY, either through accident, or some disturbance of the natural surroundings by man, a condition will occur which is extremely favorable to birds, and they are not slow to utilize that condition, using it as long as it exists, deserting it just as promptly when it ceases. Such a condition arose at Camp Barkeley, Texas, a hot, dry, dusty, locality which is practically waterless, when the Army Engineers built a sewage disposal system to serve the camp.

Camp Barkeley, built late in 1940, is in the southwest corner of Taylor County, Texas, about 200 miles directly west of Dallas. The country is mostly flat and treeless, with the exception of the mesquite, which has grown to the point where it covers most of the uncultivated land to a height of possibly eighteen feet, and must be kept assiduously rooted out, if the land is to survive. The camp proper is separated from the 'maneuver area' by a chain of low, steep-sided, mesa-type hills, which are densely covered with scrub oak and mountain cedar, and have a flat 'caprock' top stratum of stone resembling limestone. These hills form a natural amphitheatre, in which the cantonment area is located, and it was on the northeast edge of that area where these observations took place.

In the camp area, and the country surrounding the camp, birds have apparently always been quite scarce, the only common ones being the Scissor-tailed Flycatcher, Lark Sparrow, and the Desert Horned Lark. These three were the only breeding birds in the camp itself, both because of the lack of cover, and the presence of thousands of troops at all times. No waterbirds have ever been seen in the camp, as far as I have been able to ascertain.

The locality where the observations took place was known as the "Broad Irrigation Project," a long series of settling pools where the sewage generated within the camp was ultimately disposed of. The unpleasant connotations connected with the phrase "sewage disposal" did not seem to concern the birds in the least, as the engineers, concerned only with sewage disposal, unwittingly created a paradise, in that desert, of cool, quiet pools, with willow-bordered embankments and plenty of excellent cover, a haven that was previously unknown there. The birds wasted no time in using it.

The system consisted of a series of interconnected ponds, each about four hundred feet square, separated by high embankments which were planted with willow and alder to prevent their erosion. As the water passed from pool to pool, the algae count dropped, and when it finally

passed to the runoff ditches, it was fairly pure and clear. These final ditches were about a thousand yards long, parallel, a wilderness of trees, weeds, water plants and lush grass.

At the end of these ditches was a small dam, which impounded the water prior to its release down a dry stream bed, and caused a drowned woodland of low mesquite. The entire system, in fact, presented a perfect resting place for migrants, and a nesting place for residents, which had never been there before. As the war lasted, and the camp prospered, the pools were always full, creating an excellent place for ducks, although the lack of shore precluded the presence of shorebirds. However, late in 1944, and early in 1945, as the troop strength dropped, the water level dropped accordingly, revealing rich mud flats, surrounded by head-high weeds. Shorebirds were not long in taking advantage of the situation, and they were seen commonly all through the area from early spring until late October, 1945, when the pools, one by one, dried up.

Now the ponds and ditches are dried up and overgrown with rank weeds, with the mesquite moving back in where the willows were planted, and the sand covering the rich mud flats. But, although reverting to its prewar status of semi-desert, that small section of Texas has had a procession of birds which it probably never saw before, and may never see again. A briefly annotated list follows:

EARED GREBE.—The commonest grebe, which wintered in small numbers. Spring-plumaged migrants stayed until May 10.

PIED-BILLED GREBE.—Very uncommon migrant. Small groups of three and four were the largest flocks ever observed.—It did not nest, and was seen in the fall from August 18 on.

DOUBLE-CRESTED CORMORANT.—One record only. Four were seen May 22, very late record.

AMERICAN EGRET.—Quite common in the fall. As many as 15 were seen in one small flock.

GREAT BLUE HERON.—Very common permanent resident. No evidence of nesting.

SNOWY EGRET.—Common in the fall only.

(ANTHONY'S) GREEN HERON.—Quite common. One nesting record.

LITTLE BLUE HERON.—Quite common fall bird; as many as 40 at one time, in the middle of August. At no time were there ever any adults, either of this species or any of the other herons called "white" herons, seen near a nest.

LOUISIANA HERON.—Only one record, August 22, 1945, in the company of a small flock of Little Blue Herons and Snowy Egrets.

BLACK-CROWNED NIGHT HERON.—Quite common. Four barely full-fledged young were flying on May 12, 1945, so that there were probably nesting activities. Twenty immatures were later observed in the drowned woods, indicating the possibility of a rookery.

YELLOW-CROWNED NIGHT HERON.—Fairly rare. Fully adult birds spent the summer, and there was a possibility of a nest, although no immatures were identified as such.

WHITE-FACED GLOSSY IBIS.—One record only. Two individuals flew over the drowned woods on the evening of May 3, 1945, circled a while, then left.

MALLARD.—Very common permanent resident, although there never was any nest found.

BLACK DUCK.—Very uncommon winter bird. Several seen in February, 1945. They stayed until late March, then left. No further records.

GADWALL.—Common resident, possibly nesting. Scattered flocks of these birds spent the winters, and small numbers stayed on the pools all summer. No nests or young.

BALDPATE.—Wintered sparingly; uncommon migrant. Never more than 15 at one time seen.

PINTAIL.—Uncommon migrant, scattered individuals appearing now and then. First fall migrants appeared July 27, 1945, and stayed until October.

GREEN-WINGED TEAL.—Common winter bird; very common migrant, and a few spent the summers. This is one of the commonest birds on the ponds.

BLUE-WINGED TEAL.—Uncommon migrant. A few spent the summer, but there was no evidence of a nest at any time, although the birds were paired off.

CINNAMON TEAL.—Uncommon migrant. The first appeared April 1, and scattered flocks and individuals stayed until 24 were seen on May 2.

SHOVELLER.—Probably the commonest duck. Large numbers wintered, and even larger numbers migrated through. At one time, on one pond, 228 birds were counted, giving the impression that the pond was literally covered with them.

REDHEAD.—Uncommon in winter and during migration, although several were always on the pond. A few spent the summer of 1945, although their plumage was so poor as to indicate sick birds.

RING-NECKED DUCK.—Very uncommon migrant. A few seen with scaups.

CANVAS-BACK.—Uncommon migrant. Small flocks, up to 18 or 20, were present all through migration, and a few females spent the summer of 1945.

LESSER SCAUP DUCK.—Winters sparingly. Flocks of about 60 appeared about February 15, and stayed until May 7, 1945. A few summered.

BUFFLE-HEAD.—Uncommon migrant. Never more than seven seen at once. No winter records.

RUDDY DUCK.—Very common migrant. First appeared on February 2, and gradually increased until one flock on April 28 had about 400 individuals. Several spent the summer of 1945, including a full-plumaged male. No sign of a nest.

RED-BREASTED MERGANSER.—One record only. The water was apparently too shallow for mergansers, as they were rarely seen on the ponds.

TURKEY VULTURE.—Very common permanent resident. Probably bred in the hills.

BLACK VULTURE.—Uncommon permanent resident. No evidence of breeding.

MISSISSIPPI KITE.—Uncommon. First appeared about April 28, and a few scattered individuals spent the summer. Although no nest was ever found, it is quite probable that the birds breed in the low mesquite woods near the ponds.

SHARP-SHINNED HAWK.—Very rare bird. One record only on the ponds, January 2, 1945.

COOPER'S HAWK.—Also very rare. Two birds, probably migrants, spent five days near the ponds, late in April, 1945, but did not linger.

RED-TAILED HAWK.—Uncommon permanent resident. Probably nests in the hills, as one or two were observed almost daily near the ponds.

SWAINSON'S HAWK.—Probably the commonest hawk. Scattered individuals seen constantly, and a pronounced migration wave seen May 2, 1945.

MARSH HAWK.—Very common permanent resident.

DUCK HAWK.—One to three individuals seen daily covering the ponds from March 4 until May 2. Although there were no convenient perches for them, they seemed quite content to perch on hummocks, wherever found. They fed almost exclusively on shorebirds, and on one occasion a female caught a Green-winged Teal. It seemed that at no time was there an occasion when there was not at least one of them in sight.

PIGEON HAWK.—Very rare; one record only, April 2, 1945.

SPARROW HAWK.—Quite common permanent resident. Nests commonly all around the project, and they are always in evidence.

BOB-WHITE.—Uncommon permanent resident.

SANDHILL CRANE.—Very rare; one record.—Two seen April 6, 1945.

SORA.—Rare migrant; only a few ever seen. More often heard at dusk during migration.

AMERICAN COOT.—Common migrant; does not winter. First fall record August 4.

KILLDEER.—Very common migrant; breeds. Young found June 10.

SEMIPALMATED PLOVER.—Uncommon migrant; never more than a few seen at one time. Last spring record, April 28. First fall record, August 10.

WESTERN SNOWY PLOVER.—August 15, 1945, is the only record.

WILSON'S SNIPE.—Rare migrant. First seen February 26; last seen April 2. At no time were there ever more than a few of these birds, and they were exceedingly hard to flush. No fall records at all.

SPOTTED SANDPIPER.—Locally common. A few summered, although there was never any evidence of a nest. Quite uncommon in the fall.

SOLITARY SANDPIPER.—Uncommon fall and spring migrant.

GREATER YELLOW-LEGS.—Quite common migrant. Forty individuals in one flock April 28, 1945.

LESSER YELLOW-LEGS.—As many as 200 in one flock at one time, mixed with the Greater Yellow-legs.

PECTORAL SANDPIPER.—Very common migrant. First seen February 14; stayed until May 10. First fall migrants seen July 17, and commonly thereafter.

WHITE-RUMPED SANDPIPER.—Common migrant. A very late migrant, it did not appear at all until May 10, when small groups of two and three were present, exclusively with the Dowitchers. Their numbers increased until there were possibly 275 to 300 on May 28. Although still here on the first of June, the fall migrants appeared July 25, still in the company of the Dowitchers.

BAIRD'S SANDPIPER.—Very uncommon migrant. Only a few ever seen at one time, except during the week of April 14 to 22, when a flock of about 60 was scattered all over one of the pools. This flock stayed together, by itself.

LEAST SANDPIPER.—Uncommon migrant. A few were present from March 15 until June 1. Fall migrants first appeared on July 25.

(? LONG-BILLED) DOWITCHER.—One of the commonest shorebirds on the entire project. First seen March 14, 1945, they gradually increased until there were probably 2000 on April 20. Every pool had its large flock, and they were overflowing into the adjacent fields. The Duck Hawks fed almost exclusively on the flocks, and would plunge into them every time they had the chance.

STILT SANDPIPER.—Uncommon migrant. First seen April 10; last seen May 26. Never more than six or seven to a flock, usually with the phalaropes. First fall migrants August 6.

SEMIPALMATED SANDPIPER.—Common migrant. Large flocks, probably thousands of "peeps" were always present, although the flocks were usually too far away

to be identified with certainty either as this or the next species. Numbers of both were identified although the status of neither was determined.

WESTERN SANDPIPER.—Common migrant (*See* preceding species).

HUDSONIAN GODWIT.—Very rare migrant. Two individuals appeared on the project April 28 and spent the day. They associated with Greater Yellow-legs or stayed by themselves, and left in the early evening.

AMERICAN AVOCET.—Never seen until the water receded. First seen April 28, gradually increasing until as many as 30 were seen at once. On June 9, nine pairs were present, but spent their time on inaccessible islands, where they were probably breeding. As the water receded further, two nests were found, all with eggs, and later six more nests. On July 6, eight nests were present, each with four eggs, and on July 13, they were all washed out by a heavy rainstorm. Many nests must have been successful, however, as there were 25 immatures present on July 27. They stayed until late September.

BLACK-NECKED STILT.—First appeared May 14. Stayed through June, and eight were seen on July 1, apparently male and female, although no nests were ever found. They objected violently to everyone's presence near them, and there is no doubt that they were nesting. They were last seen August 22.

WILSON'S PHALAROPE.—Very common migrant. First seen April 2, gradually increasing until they were by far the commonest bird on the ponds. There were an estimated 4000 on May 10, but they were all gone by May 16.

First southbound migrants appeared July 7, and they increased until there were about 300 on August 3. Not nearly so common as in the spring.

HERRING GULL.—Uncommon in winter; only a few.

FRANKLIN'S GULL.—One seen April 6; about 30 April 22. All gone May 1.

LEAST TERN.—One record only, April 29. This bird appeared in the early evening, landed for a while, then continued cross-country northward.

BLACK TERN.—Common migrant. First appeared April 28 and stayed until May 19. A few fall records, beginning July 15.

MOURNING DOVE.—Very common permanent resident. As the commonest wildflower in the entire camp was the wild sunflower, these birds prospered. Nests with eggs as late as August 3.

YELLOW-BILLED CUCKOO.—Uncommon migrant, which probably breeds. Seen sparingly all summer, usually carrying food.

SCREECH OWL.—Rare permanent resident.

(WESTERN) BURROWING OWL.—Two records only; one bird on November 12, 1944, and one only on February 8, 1945.

NIGHTHAWK.—Very common breeding bird.

CHIMNEY SWIFT.—Very common migrant and summer resident.

BLACK-CHINNED HUMMINGBIRD.—Fairly common summer resident.

BELTED KINGFISHER.—Unaccountably rare. One pair, only, seen during the entire period, in the midsummer of 1945.

RED-SHAFTED FLICKER.—Fairly common winter resident. No summer records.

GILA WOODPECKER.—Uncommon permanent resident. Usually one pair could be found at all times, although they seemed partial to live-oak groves, which did not occur near the project. May possibly nest.

HAIRY WOODPECKER.—Quite rare permanent resident.

DOWNY WOODPECKER.—Fairly common permanent resident. Nests occasionally; two found.

LADDER-BACKED WOODPECKER.—Rare permanent resident. Possibly nests.

RED-BELLIED WOODPECKER.—One record only; August 10, 1945.

EASTERN KINGBIRD.—Rare migrant. Several seen May 12, 1945, in a flock of Arkansas Kingbirds, but not otherwise observed.

ARKANSAS KINGBIRD.—Common migrant; April 2 until May 18, 1945.

SCISSOR-TAILED FLYCATCHER.—The most common bird of note. They first appear about the last of March, and seem to sit atop every fence post and pole. They seem quite fearless, as one nest with four young was found ten feet from the entrance to an officers' club.

Nests were found June 10, 19, 22, and 28. In the fall, large flocks of these birds sit on exposed ridges, facing into the wind, looking like large flocks of sandpipers.

BLACK PHOEBE.—One record only; May 14, 1945.

VERMILION FLYCATCHER.—One record only; September 18, 1943.

DESERT HORNED LARK.—A few around the project at all times, although they are quite common on the flatlands of the range, several miles west of the project.

TREE SWALLOW.—A few migrants May 13, 1945, straggling from a large flock seven miles west.

ROUGH-WINGED SWALLOW.—A few skimming the pools during the summer, seemingly strays from a nesting colony south of the project. No swallows nested on the project, proper.

BARN SWALLOW.—Several seen May 6, 1945, the only record.

CLIFF SWALLOW.—A few on the pools, stragglers from large colonies south of here, where possibly 300 pairs nested under one bridge.

PURPLE MARTIN.—First arrivals about the end of March. Nesting commonly.

BLUE JAY.—Very rare on the project. Only one record, although these jays are quite common twenty miles south.

WHITE-NECKED RAVEN.—Permanent resident, quite common, although commoner in the winter than summer. All winter long, lines of them straggled from their roost in the woods to the south; then in the evening they straggled north again.

AMERICAN CROW.—Although both ravens and crows are locally called "crows," the crow is quite rare. The only safe method of identification is its note, which is quite different from the raven's. It is a permanent resident south of here.

(? BLACK-CAPPED) CHICKADEE.—The chickadee here is a quite common permanent resident, and although it seems to be the Black-capped, the note of the local birds is considerably different from that of the Northern Black-cap.

BLACK-CRESTED TITMOUSE.—Rare resident. Seen only once on the project and sparingly elsewhere. They seem to prefer live-oak groves.

PLAIN TITMOUSE.—Rare resident. Never seen on the project, although seen several times to the north and south of it, more commonly in winter than summer.

VERDIN.—First migrants on April 28, and common thereafter. They nest quite commonly in the mesquite woods, where their notes can be heard all day long, no matter the heat.

WHITE-BREASTED NUTHATCH.—One record only, November 28, 1944.

BEWICK'S WREN.—The common summertime wren. They first appear about the middle of February, and sing in every yard until late fall. No nests ever found.

LONG-BILLED MARSH WREN.—Very rare spring migrant. First seen April 2, 1945; stayed until April 20. Despite the presence of ideal breeding grounds, they were not found all summer.

ROCK WREN.—Rare summer resident. One record on the project, although they nest south of the range, where nests have been found. Probably common on the rocky parts of the maneuver area, which are mostly inaccessible.

CAROLINA WREN.—Rare and local. One record on the project, November 18, 1944, although it occasionally appears in the settled parts of the county.

(WESTERN) MOCKINGBIRD.—Probably the one common bird that seems to be in all places.

BROWN THRASHER.—One record only; two on April 2, 1945.

ROBIN.—Rare migrant and winter resident. A small flock seen October 22, 1944.

EASTERN BLUEBIRD.—Uncommon winter resident. Occasionally seen in small flocks all winter. Usually gone by the end of February.

CEDAR WAXWING.—Common permanent resident. As the hills south of the camp are covered with mountain cedar, this bird abounds. Large flocks are always in evidence.

(? WHITE-RUMPED) SHRIKE.—Common permanent resident. A nest, with five half-grown young, was found April 28, 1945.

STARLING.—Very common winter resident, in the company of cowbirds and red-wings. They spend the entire winter around the buildings in camp and in town, and are all gone by the middle of March.

HUTTON'S VIREO.—Rare migrant. Two seen May 12, 1944.

ORANGE-CROWNED WARBLER.—Rare winter resident. An occasional individual seen on each field trip all winter long. Usually gone by the middle of April.

CALAVERAS WARBLER.—An occasional spring migrant. Two until April 28, 1945.

YELLOW WARBLER.—Rare migrant. Only two records; April 26 and May 4, 1945.

MYRTLE WARBLER.—Rare winter resident. First seen about December 5, staying until late February. Commoner in towns.

(? WESTERN) YELLOW-THROAT.—Rare migrant; one record, April 28, 1945.

ENGLISH SPARROW.—Very common permanent resident. These birds are much commoner in the country, where they nest in colonies in trees.

WESTERN MEADOWLARK.—Common winter resident. Identified by notes alone, although an occasional 'Eastern-sounding' song is heard. They start to sing about February 1, and are all gone by the end of April.

YELLOW-HEADED BLACKBIRD.—Common migrant. First seen March 26 and commonly thereafter until late April. First fall migrants seen about July 13 in full spring plumage.

RED-WINGED BLACKBIRD.—Common permanent resident.

ORCHARD ORIOLE.—Surprisingly common. Full-plumaged males in full song are quite common all through May and June, although no amount of searching has revealed a nest. As there were females present also, it was reasonable to assume the presence of nests, so many hours were spent with no success looking for at least one.

SCOTT'S ORIOLE.—One record only, probably a straggler, June 10, 1944.

BULLOCK'S ORIOLE.—Very common summer resident. First appeared about April 1, and was constantly present all summer long. No nests, although plenty of immatures were seen towards the end of summer. These birds were present in every dooryard.

BREWER'S BLACKBIRD.—Fairly common winter resident. Usually in the company of starlings, cowbirds, and red-wings. Gone by the middle of March.

BRONZED GRACKLE.—Common summer resident. Occasionally seen on the project, but they were quite common in town. Large flocks about August 3 on the project.

GREAT-TAILED GRACKLE.—Only one record on the project, July 25, 1945.

COMMON COWBIRD.—Very common winter resident, not seen in summer.

CARDINAL.—Very common permanent resident.

BLUE GROSBEAK.—Uncommon summer resident. First appeared April 28, and remained, a few here and there. Parents feeding half-grown young August 6, 1945, so it definitely breeds. However, no actual nests were found.

PAINTED BUNTING.—Common summer resident. First migrants about April 12, then quite common thereafter. No doubt nests, though no nests were ever found.

HOUSE FINCH.—Very common permanent resident.

ARKANSAS GOLDFINCH.—Uncommon permanent resident, preferring the tops of the cedar hills. Quite rare on the project, although they have been seen there.

CANYON TOWHEE.—One record only, April 12, 1945.

LARK BUNTING.—Rare migrant. One record only; two seen October 2, 1945.

(WESTERN) SAVANNAH SPARROW.—Rare migrant, none seen after May 1, 1945.

(WESTERN) GRASSHOPPER SPARROW.—Common migrant, April 24 until May 15.

(WESTERN) VESPER SPARROW.—Common migrant, April 15 until May 18.

RUFOUS-CROWNED SPARROW.—This pretty sparrow was a rare migrant, appearing early and singing softly in secluded places. The latest record was on May 1, when at least ten of the birds were seen on the project at one time.

DESERT SPARROW.—Rare summer resident; breeding. This secretive bird arrived unheralded, and it did not sing until May 3, when it was first seen. No nests were ever found, although the birds were locally common all summer until July 29, when many immatures were seen, apparently migrating southward. There were no further records after August 1.

CASSIN'S SPARROW.—Common summer resident, first appearing about March 21. Although they are fairly common, they are quite secretive, and difficult to locate, both because of this and the ventriloquial nature of their song. Twenty-three singing males were found on July 23, but at no time were any nests found.

PINK-SIDED JUNCO.—Common resident from late November until February 18. Although juncos were quite common, no other species was identified, so they were all assigned to this form.

LINCOLN'S SPARROW.—On March 22, 1945, several were seen on the project, furnishing the only record. The birds were not singing, so it can be assumed that they probably migrate through there quite commonly, but secretively. They winter commonly in San Antonio, about 280 miles south.

(WESTERN) CHIPPING SPARROW.—Rare migrant, seen and heard from April 1 until May 10. Some have been seen in late August, but are presumed to be early migrants and not summer birds.

BREWER'S SPARROW.—Very common migrant. Large flocks of this delightful bird were in every grove and dooryard from April 8 until the middle of May. They reappear about September 1 and stay until the middle of October, easily identified by their peculiar buzzing song.

FIELD SPARROW.—Rare migrant. Last seen May 1, 1945, although some appeared on August 10—probably early south-bound migrants.

WHITE-CROWNED SPARROW.—Common winter resident. Seen all winter long in the damper wooded parts of the drowned forest. Last seen April 26.

SONG SPARROW.—Very rare; one record only, April 22 to 28, 1945.

Tentative identifications were made of Texas Nighthawks and Poorwills, although it was never possible to confirm this through observations, and no collecting was done as it was not permitted on the reservation.

CONCLUSIONS

It will be seen that between sixty-five and seventy species were benefited by the temporary presence of the project, as it furnished a resting place for them in the middle of the dry wilderness of West Texas, a situation which does not exist, as far as I could ascertain, for several hundred miles north or south of there. It is certain that the residents of the area benefited by its presence, as they were definitely more common in that particular spot than they were anywhere else on the reservation. It was unfortunate that I could not take more time from military duties to carry on my observations further, as I am certain that many more interesting notes could have been made.

Camp Gruber, Oklahoma
January 26, 1946
(Rec'd. March 17, 1947)

OBSERVATIONS ON NESTING ASSOCIATES

BY J. SOUTHGATE Y. HOYT

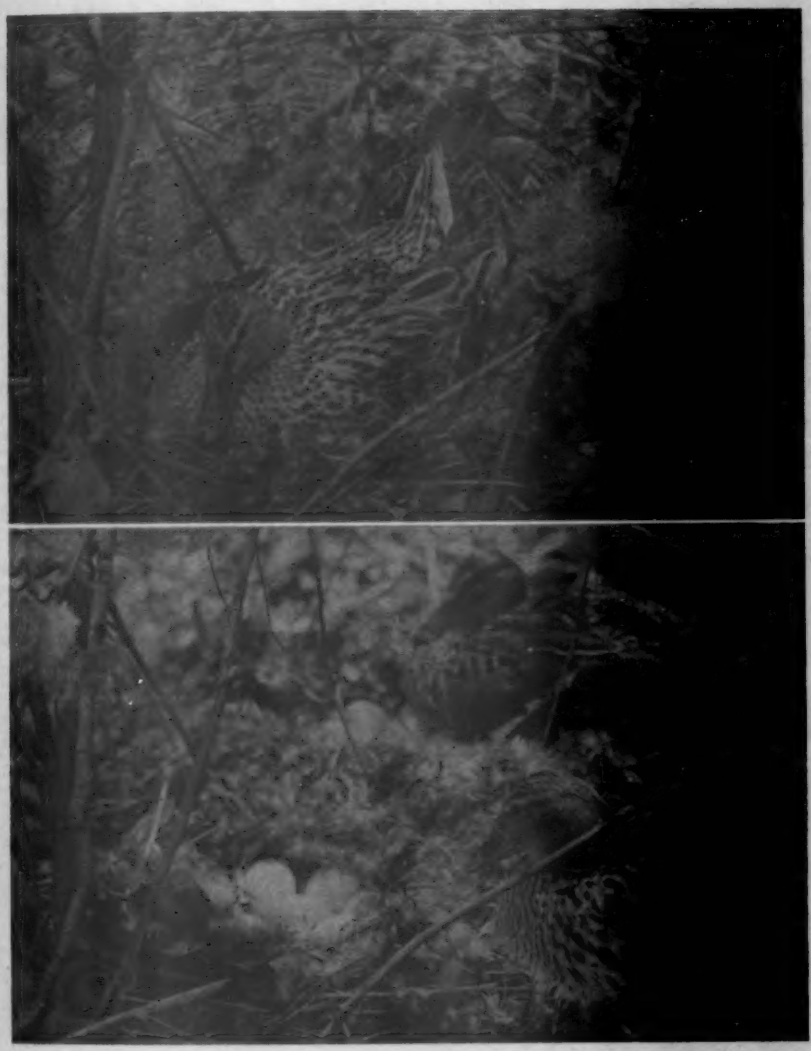
Plate 7

INTRODUCTION

ANYONE who has done much field work is certain to have had some interesting and even strange experiences with nesting birds. It was my belief at first that these unusual incidents were possibly very rare and that such observations were few and far between. Upon talking to many persons with considerable field experience I find that most of them have noted incidents that are of particular interest to our understanding of bird relationships and especially bird associations. Many of these incidents should be published for the benefit of those of us who are interested in the life-history phase of bird work. We are apt to make statements pertaining to the isolation or territory tolerance of certain birds to other species and then find several exceptions. If all were known from all possible sources possibly our ideas of territory tolerance might change a little. Such has been the case with my own work. It is with this in mind that I present this collection of observations on several species of birds.

1. RED-EYED TOWHEE AND FIELD SPARROW SHARE NESTING SITE

On June 6, 1942, Mrs. Hoyt and I found a white pine on a heavily wooded area near Ithaca, New York, that contained two nests, both



DOUBLE MALLARD NESTS, SHOWING PROXIMITY OF DUCKS DURING INCUBATION.

with young at the same time. One nest was of a Red-eyed Towhee (*Pipilo erythrophthalmus*) and was placed between the two stems of the pine and not more that three feet from the ground. This nest contained three young and one unhatched egg. The young were about five days old and were being brooded by the female when we first discovered the site.

On a limb to the left of this nest and exactly eighteen inches from it was placed a nest of the Field Sparrow (*Spizella pusilla*) also containing young, four in number, about five days old. This nest was not well built and was about ready to drop off the limb had it not been for a few well-placed pieces of grass bound around the limb at the edge of the nest.

We returned on June 8 to photograph the nests and make further observations. While in the blind we had ample chance to witness the reciprocal relations of these two nests. Repeatedly the male Towhee fed his young and cleaned his nest, then moved down the limb to clean the sparrow nest. Upon one occasion the male Towhee found that his own young were too full to accept the green caterpillar he had to offer them, so after several attempts to feed them he took the food to the sparrow nest where it was well received by the young of that nest. He cleaned this sparrow nest and went after more food. Upon returning he went straight to the sparrow nest where again the food was well received by the young sparrows.

Waiting long enough in the blind brought its reward, for the sparrow came in to feed its young, then went to the nest of the Towhee and looked in. When it returned it alighted on the edge of its own nest but, receiving no great response, hopped up the limb to the Towhee nest and proceeded to feed the young of that nest.

At no time while we were in the blind was the female Towhee seen at the nest nor did she make any attempt to come to feed her young. Throughout the two hours that we stayed near the nests, we witnessed this exchange of nesting attention by these two birds some fifteen times.

When there were so many suitable nesting sites available, why did these two species nest in the same tree? Were there some territory fights at the beginning of this reciprocal relationship? Such questions inevitably stimulate one's thoughts and provoke more attention to field studies of our commoner species.

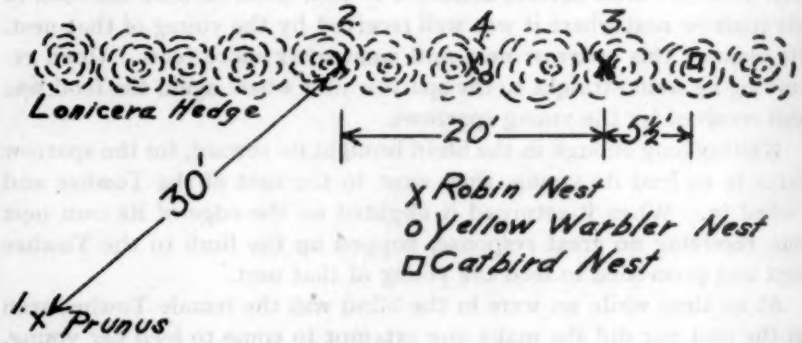
2. Crowded Robin Territories

Howell (1942) states that where two Robins are found to nest close together the line separating their boundaries may lie about halfway

between the two nests. He also mentions that the actual size of the territories may vary a great deal in proportion to the number of Robins present.

In May, 1942, Mrs. Hoyt and I found several nests in our yard near Ithaca, that seemed much too close for any territory relationships. Nest number one was located in a cherry tree (*Prunus avium*) while nest number two was in a honeysuckle hedge (*Lonicera Morrowi*) just thirty feet away. Nest number three was placed in the same honeysuckle hedge exactly twenty feet from nest number two, and about fifty feet from nest number one. In the hedge, also, and between the robin nests numbers two and three, was a Yellow Warbler nest (*Dendroica petechia*) and some six feet past nest number three was one of a Catbird (*Dumetella carolinensis*). Nest number one contained young, number two held incubating eggs, and number three was under construction.

To add to the already confused picture, a fourth Robin nest was placed halfway between nests numbers two and three in the same bush and ten inches from the warbler nest (*see* Text-figure 1).



TEXT-FIGURE 1.—Overcrowded Robin territories showing Robin nests in close proximity to each other and to nests of other species.

The young left number one with no trouble as was true with number three, but number two was deserted just after number four was started. Eggs in number four were being incubated when I last checked the situation just before I left for the army. The Catbirds got their young off successfully as did also the Yellow Warblers.

Such a situation as this would be very fascinating to study in great detail with careful observations on interspecific and intraspecific relationships and the territorial complications. Possibly such associations are more common than we dare think.

3. COWBIRD ATTACKS A YELLOW WARBLER ON NEST

On April 28, 1942, in Forest Home, a residential section of Ithaca, a Yellow Warbler started a nest in the crotch of a dead tree just off the edge of the roof of my apartment. By the next day the nest appeared well shaped and seemed to need only a lining to complete it.

May 6: Today while eating lunch I heard a strange, squeaky, fussy noise at the Yellow Warbler's nest. The birds were still placing bits of lining within the nest and the female had just brought in a mouthful of what appeared to be fuzz from the willow catkins. She was sitting in the nest with her wings spread out over the surface and her tail spread, and she was all puffed up in general appearance. In the bush approaching the nest was a female Cowbird (*Molothrus ater*). As the Cowbird got closer to the nest, the warbler became more excited and at times stood up, continuing to give this pitiful, squeaky cry. The Cowbird finally came up beside the nest and, leaning over, gave the warbler a hard blow on the head. At this the warbler became more aggressive and returned the blow by striking at the Cowbird, I think actually hitting her in the neck. The Cowbird gave several other hard blows and received as many blows from the little warbler. Finally the warbler jumped onto the rim of the nest, still with her wings outspread and still crying, and flew at the Cowbird, driving it from the bush but remaining there herself. She then jumped up on a limb above the nest and sang as well as a male. At this point the male came in and perched beside the nest, singing, while the female flew into a near-by tree. The female Cowbird was soon joined by a male of the same species and flew away. This behavior of the Cowbird seems to be out of the ordinary, for it is usually thought of as laying in nests while the owner is away. Also it usually lays in nests that already contain an egg, but in this case the nest was still being built.

May 8: It was about eight o'clock in the morning when we were again disturbed by the distressing cries of the Yellow Warbler. Upon looking out we saw a truly pitiful situation. On the nest was the female warbler as before with her wings out, tail spread, bill open, and in the greatest of excitement protecting her nest from the advances of a female Cowbird which, in turn, was escorted by two male Cowbirds, all calling and the males courting. The male warbler soon appeared on the scene. The female Cowbird approached the warbler nest as closely as possible but this time did not attempt to strike the warbler. The Cowbird was driven off as before by the aggressive attacks of the female warbler. In her departure she was accompanied by her two courting males; none of them returned to the nest as long as I was

able to watch it. The two warblers soon left the nest together but the female returned when a pair of House Wrens (*Troglodytes aëdon*) perched on the roof above the nest and scolded.

May 11: The Yellow Warblers have not been around the nest for the last few days, but on looking into the nest I found one cold egg on the bottom.

May 13: I watched the nest for several days following the discovery of this egg but did not see the birds at all interested in the nest. Both birds have been heard singing in near-by trees. Today the female appeared at the nest and seemed to pull at the sides but did not enter it. There is still just the one egg present.

May 17: To date the only one of the birds appearing at the nest has been the female which continues to pull at the sides and edges from time to time. Upon investigating I found that the nest had been considerably torn apart and the edges are ragged and thin. The remains of the eggshell were on the ground under the nest. The pair of Yellow Warblers are still in the neighborhood, possibly with another nest. The nest observed was made partly of pieces of a tent caterpillar nest situated in a chokecherry tree across the road. While building the nest the female was seen flying repeatedly back and forth between the two places.

May 23: A Yellow Warbler nest was found at the side of the house in a *Lonicera* bush. I believe this to be a product of the same pair of birds involved in the ill-fated nest under our roof, for the female is unusually brightly colored and sings a very clear song at frequent intervals.

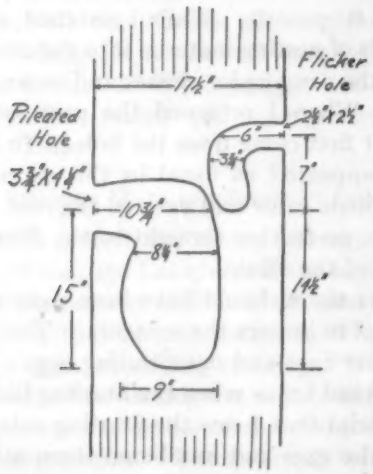
4. The Pileated Woodpecker Shares Its Nesting Stump with a Flicker

In May, 1939, while studying the nesting habits of the Pileated Woodpecker (*Ceophloeus pileatus*) in Ithaca, I encountered a very strange situation that seemed quite different from the recorded behavior of these birds.

Dr. James Tanner reports that he once witnessed a fight between a Pileated Woodpecker and a Flicker over a nesting hole, in which the larger bird emerged victorious by driving the Flicker away. I have also seen a fight for territory between these two birds, when the Pileated Woodpecker won by driving the Flicker about a quarter of a mile through the woods. Audubon (1842) cites a case where some Bluebirds had nested in an old Pileated Woodpecker nest only to have the woodpeckers return later in the season and bodily carry the young Bluebirds out and drop them some distance from the nest.

At the nest under my observation, while the young Pileated Woodpeckers were just six days old, a pair of Flickers came to the nest stump and started an excavation on the side opposite to that on which the Pileateds had dug their hole. The Flickers worked on their hole intermittently for several days and by the time the Pileateds were twelve days old the Flickers had completed their nest cavity—a masterful piece of work. On this day both species arrived at their respective nest holes at the same time but paid absolutely no attention to each other.

This Flicker hole was started just six inches above the roof of the other hole and I feared that the excavation might go through into the other nest. When the Flicker hole reached the level of the roof of the Pileated Woodpecker's hole it was turned a little to the outside and continued downward, with the net result that its floor was opposite but below the roof of the other nest. This situation is clearly illustrated in the accompanying drawing (Text-figure 2). The tree measures 17½ inches in diameter at the Pileated Woodpecker's nest. This hole went into the tree 10¾ inches as measured from the bark to the back of the hole. The Flicker nest went into the tree six inches and was larger toward the bottom than at the entrance. This means that 16¾ of the 17½ inches of diameter is occupied with these two holes so at the most the partition separating the two nests cannot measure more than three-quarters of an inch. Actually it must be considerably less for the flicker hole bulges on the inside. (*See* Text-figure 2.)



TEXT-FIGURE 2. Diagram showing relative positions of Pileated Woodpecker nest and Flicker nest in the same tree.

Why do some birds tolerate situations like this and others not? When the young Pileated Woodpeckers left the nest the Flickers were incubating seven eggs, and in due time six young left the nest successfully; the seventh egg did not hatch.

5. A PILEATED WOODPECKER HATCHES A STARLING EGG

I had found a Pileated Woodpecker nest and had seen it through several days of the building process, visiting the nest every morning early to observe the first signs of egg laying. On April 19, 1941, I had observed the female enter the nest early, remaining about an hour and a half, and then leave for the rest of the day. This I knew from past experience meant the laying of the first egg. I was especially anxious that nothing disturb this nest now that egg laying and incubation were starting, so I always remained a safe distance from the nest tree while the parent birds were in attendance.

On April 20, I arrived at the nest in time to see the male leave from his night roosting on the nest and to see the female enter. Once again the female remained about an hour and a half and then left for the day. I was waiting to make sure that the parents were not going to return to the nest again this morning when a Starling (*Sturnus vulgaris*) came to the tree and seemed to show interest in the nest hole. I was undecided whether to shoot the Starling to prevent any interference with this well-situated nest or to let nature take its course. I decided upon the latter course and sat near by to see what happened. The Starling looked in the hole then flew off, only to return very shortly with some nesting material in its mouth. While I watched, the Starling carried about ten mouthfuls of nesting material into the already occupied nest. I had to return to the campus for classes and so was unable to observe what took place. When I returned the next morning I was very anxious to see what first came from the hole. To my great relief the male woodpecker appeared as usual in the entrance and soon flew away just as the female came and entered the nest. This was normal procedure so I gave no further thought to the Starling incident other than to make note of the affair.

On April 29, after there should have been eight days of incubation, I climbed to the nest to inspect the contents. The nest contained four Pileated Woodpecker eggs and one Starling egg. This was most disconcerting for I did not know when the Starling had laid the egg. All of the nesting material that I saw the Starling carry into the nest was gone. I weighed the eggs and numbered them and hastily retreated to my observation post some distance away. I was relieved to see the female woodpecker arrive and enter the nest without hesitation as she had done in the past.

By my calculation the eggs should hatch on May 10 and this they did, on the eighteenth day of incubation. I was more than anxious to learn the situation in the nest and climbed up as soon as the parent was flushed. When the contents were removed there were three young Pileated Woodpeckers, one unhatched woodpecker egg, and one young Starling. The empty eggshells were still in the nest and were carefully removed and photographed, as was also the unhatched egg.

I am at a loss to explain fully what took place in this nest. Obviously the Starling happened to lay its egg on the right day to have it hatch with the woodpeckers', but I do not know what day this was nor do I know what took place when the Pileated Woodpecker returned to find the Starling in possession of the nest. The results speak for themselves; the woodpecker was not driven from the nest but evidently evicted the Starling and its nest material so forcibly that it did not return.

This young Starling remained in the woodpecker nest for one entire day but was gone on the morning of the next. Whether the parent woodpeckers fed this little Starling or not I do not know. When I removed it upon finding it in the nest it seemed to have been fed, but I could not be sure. If it was fed in the usual manner of the Pileated Woodpeckers it must have been pure torture, for its neck was so short compared with that of the young woodpeckers that the bill of the parents would undoubtedly reach and puncture its stomach. I searched the entire area around the nest but was unable to find any trace of this baby bird, although this is not surprising since the area was very swampy, with considerable standing water.

This, to my knowledge, is the second record of a Starling becoming parasitic although in this case it was entirely accidental and absolutely unsuccessful. The first record was reported by Musselman in The Auk, 59 (4): 589, 1942.

6. A DOUBLE MALLARD NEST AT ITHACA, N. Y.

On May 15, 1942, while I was taking photographs along the waterfront at the head of Cayuga Lake, one of the local fishermen who lives at the foot of the breakwater told us of an unusual nest of a Mallard (*Anas platyrhynchos*) that he had under observation. Upon investigation we found a most interesting situation.

Two ducks had chosen a nesting site next to each other under a small bush of Virginia creeper (*Parthenocissus quinquifolia*) along the edge of the base of the breakwater. The two nests were so placed that each duck touched the other while incubating. A slight, but not too large, partition kept the nests from being a common nest. One nest contained eight and the other twelve eggs. The eggs were due to hatch

any moment and consequently the two ducks defended the nests with their lives, biting and jabbing at the intruder with vicious blows.

Talking to the local fisherman, we found that two ducks for five years past have built nests such as this and in one instance a common nest, and both ducks were attended by the same drake.

When the eggs hatched, the young of each duck went with their respective parents and when we saw them next there were two full families feeding along the water's edge. Even then the drake was to be found not too far away.

SUMMARY

A Red-eyed Towhee and Field Sparrow were found nesting in the same tree. Observations showed that each species frequently fed and cared for the young of the other species.

Four Robin nests were found very close to each other and also in close association with the nest of a Yellow Warbler and that of a Catbird. A diagram is shown illustrating the exact relationship of each nest.

A female Cowbird was observed several times to attack a female Yellow Warbler that was building her nest. The Cowbird was being courted by two male Cowbirds throughout the entire performance.

A Flicker was found sharing a nesting stump with a Pileated Woodpecker. The Flicker nest was so constructed that the floor was beside and below the roof of the Pileated Woodpecker nest. No enmity was observed between these two birds. A diagram is given showing the condition of these two nests in the same stump.

A Pileated Woodpecker incubated and hatched a Starling egg placed in its nest by the Starling during the early period of egg laying of the woodpecker. This young Starling lived in the woodpecker nest for one day and then was carried out, leaving three young woodpeckers in the nest.

A double nest is reported in which two Mallards have nests next to each other with a small partition separating them. This condition has persisted in this same locality for five years previous to this incident. The two ducks are said to have the same drake which is almost always near by.

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Etna,
N. Y.

A CHANGING NESTING HABITAT OF THE WOOD DUCK

BY T. E. MUSSELMAN

RECENTLY, students of nature have become aware of an unexplainable change in the selection of nest sites by the Wood Ducks (*Aix sponsa*) living in the swamps of the Illinois and Mississippi rivers. Formerly, these birds almost invariably nested in holes or cavities in the lowland soft maples, black or white oaks, sycamores, and even pecan trees. Before 1900, there were few references in literature to these birds nesting within the limits of the river towns. Recently, however, increasing numbers have deserted the lowlands and have actually penetrated to the very hearts of our river towns where they have nested in holes in the trees along the streets, showing favoritism to sites in parks, cemeteries, and courtyards. There are at least two recent authentic records of Wood Ducks which moved to town and there nested in covered chimneys (Peoria and Chillicothe, Illinois).

At the meeting of the Wilson Ornithological Club in Champaign several years ago, the Illinois State Natural History Survey showed a motion picture of the nesting activities of a mother Wood Duck which had used a hole ten feet up in a sycamore tree situated in the corner of the city square at Bath, Illinois. Everybody in that little river town knew of this nest, and the moment the first duckling crawled out of the nest hole, squeaking in its excitement, all traffic along the state highway was stopped or detoured for the several hours necessary for all the baby birds to scramble out of the nest cavity and for the mother to lead them safely across the dangerous concrete road, then down the bank into the slowly flowing Illinois River. At the completion of the picture I heard exclamations of surprise that a duck as wild as this 'Woodie' would venture into the very heart of a community to build its nest.

A letter from Mr. Frank Bellrose informed me that a number of Wood Ducks had nested recently within the borders of Havana, Illinois, several of which flew six or eight blocks back from the river to nest in trees about the County Courthouse yard. The same year three similar nests were discovered in the heart of Beardstown. One was situated in a sycamore tree. When the mother finally took off her little brood, she faced the insurmountable task of leading her flock through four blocks of residential streets and four additional blocks in the business district. Unfortunately, the neighborhood children and their dogs had a field day from which not a single baby Wood Duck escaped.

A letter from Dr. Aldo Leopold informs me that at Burlington, Iowa,

Wood Ducks fly to the top of a bluff, one hundred feet above the river, and there nest regularly in convenient holes. Similarly, at Keokuk, at least two nests were reported this past year (1947) high on the bluffs within the city limits. Three nests were reported within the city limits of Hannibal, Missouri, and an additional nest was discovered fifteen feet up in a tree within a stone's throw of the famous Mark Twain cave, although hundreds of persons visit this cavern weekly throughout the season.

At Quincy, for a number of years, there have been at least two nests in South Park and two additional nests in the Woodland Cemetery which lie at the top of a bluff one hundred feet high and perhaps a half-mile back from the river. However, 1946 climaxed the invasion. On June 24, somewhere in Madison Park, a brood of babies emerged; four were waddling in the water in the street gutter, an additional three were found in a neighboring fish pond, and two others were seen in neighboring yards. The mother may have deserted the ducklings as she was never seen. Madison Park is two miles from the Mississippi River and a mile from the nearest creek. Many authors, especially those of years ago, suggest that the mother Wood Duck carries her young, particularly when the nests are a considerable distance from the water. In the dozen or more instances in which I have watched baby Wood Ducks emerge from the nest holes, I have never seen one instance when the mother attempted in any way to transport or carry the ducklings.

On July 3, three calls to me told of a mother Wood Duck with seven ducklings. She had difficulty leading them through the streets and took temporary asylum in a goldfish pool. That evening the babies were captured as they scurried along the gutter of the street, and were retained in a wire trap which was placed in a small garage. Twice the mother entered this small building but evaded capture, as local conservationists wished to transport her and her tiny brood to the river for release. While these little 'Woodies' were being secured, another call was received from a block up the alley. Three additional babies were running single-file across a yard,—no doubt they belonged to the same brood.

The following day a call came from a mile away, that young Wood Ducks were being captured by neighborhood children. Many of these babies were retrieved and taken to a farm near the swamps and given to a Mallard hen whose eggs were about to hatch. Her rightful eggs were placed under a broody chicken which as foster mother seemed satisfied with the substitution of the baby Wood Ducks. Four days later a farmer, Walter Ruths, discovered a scattered brood from

which he captured two. These he placed in a box, from which the ducklings easily escaped by climbing the sides. These made a total of four known broods, hatched within a few blocks of my home, a distance of several miles from the river and its associated swamps.

The answers of river men, hunters, and scientists, whom I questioned as to the cause of this change in nesting, vary. Some feel that the building of government dams has backed water over the floodlands whereby many former nest trees have been killed. Recently, the demand of the furniture trade has caused the cutting of the large, lowland soft-maple trees, thus reducing many of the available nest sites. Others credit the trouble to predation. Certainly Wood Ducks do suffer from the attacks of many predators, including snakes, raccoons, opossums, cats, squirrels, and Great Horned Owls. Even flying squirrels and bees take possession of an occasional site.

REARING FOUNDLING DUCKLINGS IN CAPTIVITY

Of all the inland nests, certainly those in Woodland Cemetery, Quincy, have been most interesting, as Wood Ducks have returned to the nest trees for several years, thus allowing local conservationists to study the nesting habits and watch the ducklings emerge, year after year. Several seasons ago, I received a telephone call from the sexton of this Cemetery, who had found two Wood Duck nests, both of them in holes in black oak trees. One of the nests was approximately sixty feet above the ground. How the babies could tumble safely from that height without damaging themselves is more than I can understand, yet apparently for several years the different broods took the tumble safely. The sexton became so interested in their welfare that he refused to cut the grass immediately under that tree, thus giving the babies a cushion when they fell. The other nest was but fifteen feet above the ground

When a telephone call informed me that the ducklings were coming out of the lower nest hole, I drove hurriedly to the cemetery, where I used my binoculars to watch the ducklings appear. One had already tumbled to the ground where a workman had placed a wire trap over it so that it could not escape. Five minutes later another baby's head emerged from the hole. Suddenly, it started climbing, almost running up the rough bark, squealing *cheep, cheep, cheep* in wild excitement. After it had progressed three or four feet, its tiny claws slipped on a smooth section of bark and down it fell. It hit the ground, bounced an inch or two, recovered itself, and started to run with all of its tiny might, still peeping at the top of its voice.

The mother Wood Duck circled, apparently in great distress, and

as we put the second baby in the wire trap, the mother alighted on the ground and eventually approached within six feet of the babies. After a quick inspection, she jumped into the air and flew to a neighboring tree, alighting on a limb from which she watched. Twenty minutes later, another small head appeared at the opening. This baby started up another limb, chirping excitedly as it climbed. As it approached a projecting piece of bark, it jumped horizontally to the side, approximately eight inches, where it again caught the rough bark, and not until it had progressed for six feet did it slip and fall to the ground. Every fifteen or twenty minutes a similar exodus occurred until at one o'clock there were sixteen baby Wood Ducks in the trap.

In former years, the mother Wood Ducks had often led their babies to the edge of the cliff nearest the river where several were injured when they fell over the precipice. To prevent this, we followed the gently declining ravine a block downward and there placed the trap. When the mother discovered her babies, we released them, and the last we saw of them, she was leading them, single file, toward a swamp nearly a mile distant.

About six o'clock that evening, a man drove his automobile up to my farm and handed me a box. In it were six baby Wood Ducks. When I asked him where he found them, he told me that a mother Wood Duck was leading her babies toward the river and that she had flown in front of an automobile and had been killed. He had retrieved six of the babies from a water hole in the gutter. They were cold, so I wrapped an electric-light bulb with cloth and placed it in a box carpeted with a layer of sawdust. Soon I had the satisfaction of seeing them snuggle up to the light which afforded them the heat they needed.

Half an hour later, another automobile drove in. The driver had three baby Wood Ducks which looked as though they were dead. However, I sponged them with warm water until I noticed signs of life. One by one they recovered sufficiently to be added to the six which were already enjoying the warmth of the light bulb. Two additional deliveries were made that evening, making a total of sixteen baby Wood Ducks—I believe the full complement of tiny birds which I had watched leave the black oak tree in Woodland Cemetery that morning.

I keep a flock of fifteen to twenty bantam hens which are broody most of the summer. These are used to incubate sets of Bob-white eggs that are disturbed by farmers as they cut their hay. I decided to try my luck with one of these. The mother selected was a small buff cochin bantam hen which had been brooding for several weeks on two or three eggs of a previous season's 'vintage.' After dark, the sixteen babies were tucked safely under this foster mother. Fortu-

nately a cover of hardware cloth was placed over the top of the box. In the darkness the little hen apparently accepted them. The next morning, when she saw the tiny black ducklings, she could not understand her flock and began picking at them. The babies were terror stricken and began climbing the rough sides of the box but would fall back into the alfalfa pulp on the floor.

I removed the ducklings and carried them to my pasture where an unused metal trough, filled with water and streaked with green spirogyra, looked inviting. There a few water bugs were enjoying a stagnant bill of fare, so I had hopes that the tiny ducklings would get some food. When they were released, they took to the water and thoroughly enjoyed themselves, but not one duckling would eat. Fortunately, they could not climb the curved sides of the metal trough, so were safe from escape. Although there was a little landing board upon which they could rest and dry, none of them would take advantage of it, but all stayed in the water until they were saturated and cold.

Again they were removed to the box with the light bulb. Three times during the day they were released. Although they drank, they always gathered in mad confusion at the opposite end of the trough. Even when I left them alone, they were unable to accustom themselves to the strange surroundings.

At night I took each tiny bird and force-fed it with a mash which the State Conservation Department had compounded. However, they would not eat voluntarily and I was fearful that the entire brood would starve before another day had passed. In desperation, I again placed them under the broody bantam hen. She seemed to accept them with a great deal of motherly concern. Then I had an inspiration. Driving to town, I secured two electric insect-exterminators. These were hung on opposite sides of the house with a bucket half filled with water under each. As the lights were turned on, swarms of moths, caddis flies, beetles, and other insects circled the attraction, then flew into the hot wires. Few were killed; most of them fell, wriggling, into the water below, minus a wing or two. By midnight I had an abundance of insects which I placed in a container ready for my next day's experiment.

Imagine my delight the following morning to find that the little hen had accepted her brood and was trying to feed them sand and mash. They were running back and forth, playing about in the alfalfa meal.

In rearing quail babies, I employ cages about fourteen inches high and six by ten feet across. One of these was moved into the side yard and a hole was dug in the ground to house a washpan. After pouring in a generous cover of sand, I filled the pan with cistern water. The

hen and her duckling babies were then released within the pen. The little mother immediately moved to the mash and began to cluck to her babies, but the ducklings were not interested in the mash nor did they understand her feeding call. They were attracted by two handfuls of wriggling insects on top of the water. The famished babies slipped into the pan and began devouring the insects with apparent satisfaction. When the hen saw her babies in the water, she was frantic. She lowered her wings and tried to scare them from the pan, but the hungry ducklings refused to leave until they had literally gorged themselves. As I watched them, I was somewhat fearful that they might not recognize the hen as their mother. However, they were cold, and finally one by one they crawled from the water, walked single-file over to the hen and as they disappeared under her feathers, I knew that the battle was won.

Each day involved some work as the pen had to be moved to fresh soil and a new hole had to be dug for the pan, thus causing negative criticism from the better half of my family! At the end of the month, my light bill gave definite proof that the insect-killing machines had been running overtime, but as I watched the babies grow I was willing to face both criticism and expense. After four weeks, the baby ducklings became interested in the mash and soon developed into strong, husky, eager little 'wildings' which never entirely trusted any of us, yet tolerated us from a fair distance.

One afternoon, when the ducklings were about a third grown, I propped up the side of the cage, and the little fellows began chasing crickets and grasshoppers through the grass. The day of the insect-exterminators was past. Shortly before dark, the bantam hen returned to the cage and the sixteen ducklings waddled home in single file. They wanted their supper of mash. I lowered the cage and they were safe for the night. From this time on they were released each day. They grew very rapidly, yet every night they returned to eat their mash and to sleep in the safety of the cage. Flight feathers appeared in their wings and it was a joy to watch the flock washing themselves and diving in a little pond that I constructed in a neighboring ditch. When they were about two-thirds grown, one of the drakes followed a grasshopper into the high grass where it disturbed a rabbit which jumped from its bed and ran boldly across the yard. The duckling was so surprised it jumped into the air, then circled the house in its first flight, much to the surprise of the other ducklings. Within a week they were all flying. The trips became longer. They circled the barn, then flew to a neighbor's pond where they enjoyed the deeper water and the abundance of crayfish. Wanderlust drew them

away until they finally flew several miles down to the swamps north of Quincy Bay, but every night they returned to the farm. They wanted their supper of mash. One evening I did not drop the trap. The bantam led them out and tried to take them into the chicken house. Instead, the sixteen babies flew to the ridgepole at the top of the shed and there squatted comfortably. The mother bantam was thoroughly disturbed but finally drew caution aside and flew up and perched among her babies. A week later several of the ducklings failed to return. From time to time the numbers became fewer until but one baby Wood Duck returned each night. All of the Wood Ducks had been banded, and the last of them deserted on the twenty-sixth of August.

This past spring, a farmer at Beardstown discovered a Wood Duck nesting in a hole in a pecan tree where she was covering thirteen eggs. She was killed by a predator and partly eaten in the hole, and several eggs were broken, so the farmer took what remained of the clutch to his chicken house and placed them under a Plymouth Rock hen. When the ducklings hatched, the broody mother accepted them readily. The babies were started on cottage cheese mixed with starting mash and small pieces of hard-boiled egg. Of course this was supplemented with insects caught by the little family as it ranged throughout the pasture. All lived for four weeks and were thriving when a stray dog discovered them and killed the entire flock. Rearing ducklings from eggs is much easier than retrieving foundling ducks lost among the streets of towns. The mortality on such cases is reaching unfortunate proportions. Some program such as supplying nesting boxes about the swamps or locating the holes in trees along our city streets and either filling the cavities with concrete, or removing the eggs and incubating them under foster parents, should be attempted. I feel certain that within a few blocks of my home four or five dozen Wood Ducklings perished this past year because of the mothers' inability to lead their babies to proper feeding grounds. During 1947 we had a somewhat similar experience, but fortunately the mortality in young ducks was not so great as in 1946.

Quincy
Illinois

COMPARATIVE STUDY OF THE NESTING BEHAVIOR OF CHESTNUT-SIDED AND NASHVILLE WARBLERS

BY LOUISE DE KIRILINE LAWRENCE

THE study of the Chestnut-sided Warbler (*Dendroica pensylvanica*) was made during May, June and July, 1945, and that of the Nashville Warbler (*Vermivora ruficapilla*), during June, 1946. Both nests were in my study area on the west side of Pimisi Bay, just south of the Mattawa River which flows into the Ottawa River at the town of Mattawa fifteen miles farther east. The place is situated in the township of Calvin, District of Nipissing, Ontario.

For invaluable encouragement as well as assistance with the correction of this manuscript and helpful suggestions about charts and diagrams, I am particularly indebted to Dr. J. Murray Speirs and Doris Huestis Speirs. Further, I wish to acknowledge the kindness of Mr. James Baillie, Jr., who arranged for me the loan of certain literature from the library of the Royal Ontario Museum of Zoology, and of Mrs. Hugh M. Halliday, who found the nest of the Nashville Warbler and allowed me the free use of her notes.

The instruments used in both studies were an ordinary clock with large dial and a pair of 8 x 30 Zeiss marine binoculars.

THE NESTS

The Chestnut-sided Warbler's nest was discovered in the forenoon of May 27, 1945. The female was just engaged in fastening the bottom to converging stalks of a raspberry bush, about 18 inches from the ground. Two hours later the nest was half finished and the female was sitting in it moulding it into shape with breast and body. Still later a white string was observed lying across the nest and this was eventually woven into the structure. The male was not seen during the building. However, continuous observation was not possible at the time, but Kendeigh (1945) spoke of the males as being "somewhat attentive to the females during the nest-building . . . " After a day of rainy and cold weather (temp. 54–62 degrees Fahrenheit), during which little or no work was done on the nest, it was finally completed on May 29. During the next four and a half days the nest was seemingly abandoned until, at 4:50 a. m. on June 4, the first egg was laid.

The location of the nest was at the northeastern edge of a fairly open space in the woods, overgrown by what later would become a thick covering of tall bracken. In the middle of this space stood a lone poplar tree. For the rest, the area harbored little else than a few sapling white birches and aspen trees, and a couple of red maples and

hazelbushes. On all sides this open woodland was surrounded by mature second growth such as aspens, white birches, red and white pines, balsam firs and a few cedars. About 100 feet southeast of the nest there was a thick stand of firs covering a moist, mossy place in which small pools of water remained from the spring thaw. The territory of the Chestnut-sided pair comprised about three-quarters of an acre with the nest about in the center. An American Robin (*Turdus migratorius*), was incubating in a red pine 12 feet north of the nest and, later, a Least Flycatcher (*Empidonax minimus*), and a Mourning Warbler (*Oporornis philadelphia*), occupied adjoining and somewhat overlapping territories.

The nest of the Nashville Warblers was fully completed and incubation in progress when discovered during the afternoon of May 31, 1946. Mrs. Halliday, looking for nests, came upon the female as the bird fluttered amongst the underbrush "feigning injury." But it was not until she had patiently trailed the bird for more than an hour and it finally returned to the nest, that she literally unearthed its exact location. The nest was placed on the open ground but well hidden under a cluster of dead bracken leaves. At first glance it looked surprisingly like an Oven-bird's nest with the entrance on the southeast side. The site was on a dry and sandy plateau gently sloping southwards, which was overgrown with a thicket of sapling aspen trees, white birches and red maple bushes, here and there interspersed by tall balsam firs and red and white pines. To the north this thicket gave place to a stand of older mixed woods with a dense undergrowth of a variety of shrubs, such as hazel, raspberry, salix, etc., which in places was made impenetrable by criss-crossing windfalls. The Nashville territory, involving about a half acre, apparently was of oblong shape, stretching well into the above-described mixed woods to the north with the nest located in the opposite south corner. Territories adjoining the Nashville Warblers' were occupied by a pair of American Redstarts (*Setophaga ruticilla*), Mourning Warblers, Chipping Sparrows (*Spizella passerina*), Veerys (*Hylocichla fuscescens*), and a pair of Ruby-throated Hummingbirds (*Archilochus colubris*).

The construction of the nests showed all the dissimilarities inherent in one hanging in a bush and one tucked away on the ground. Rootlets, fine fibres and hairs went into the making of the ground-nest and its colors blended perfectly with those of the dead leaves and grass. The nest in the raspberry bush, on the other hand, was mainly composed of fine grasses and strips of birchbark, giving it a mottled appearance which, in the dappled light of sunlit green leaves, stalks and twigs, made it remarkably inconspicuous.

THE CLUTCHES

When discovered, the Nashville Warbler nest contained four eggs of its own and one Cowbird's egg. Friedmann (1929) listed the Nashville Warbler as "a decidedly uncommon victim" of Cowbird parasitism. He had but four records.

The Chestnut-sided Warbler began egg-laying on June 4 and thereafter laid one egg a day between 4:00 and 9:00 a. m. until there were four eggs in the nest on June 7. Several times around noon during this period, the female was observed sitting on the nest for a short while. The male was first seen on the second day of egg-laying when he sat singing in a tree above the nest.

INCUBATION

The Chestnut-sided Warbler was observed during the 1st, 2nd, 5th, 9th and 10th days of incubation in watches varying from 185 to 125 minutes. The earliest began at 6:55 a. m. and the latest one ended at 4:14 p. m.

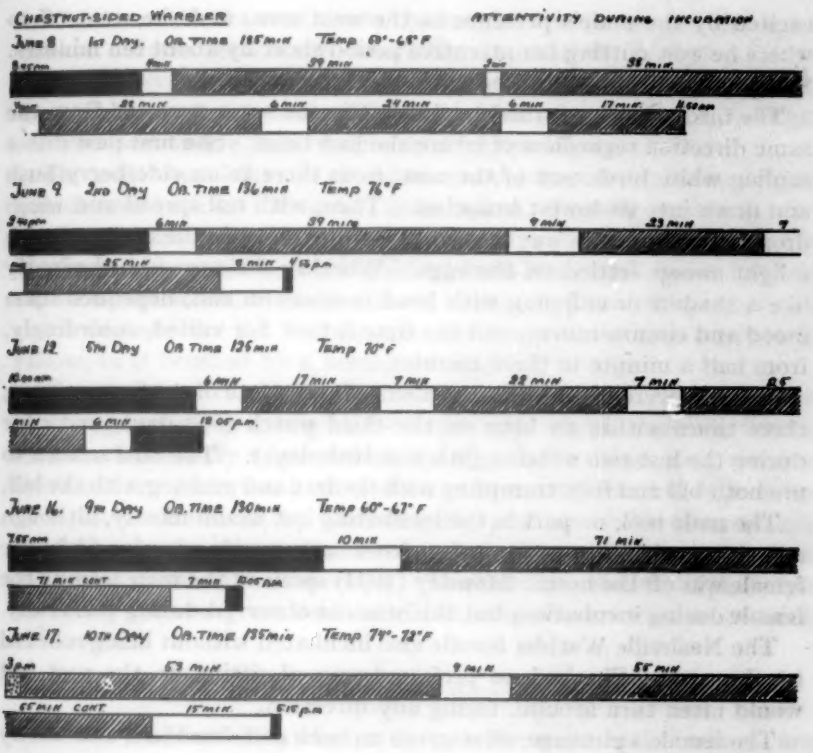
The Nashville Warbler was observed only twice on, presumably, the 8th and 10th days of incubation. The watches lasted 250 and 160 minutes, respectively, and the earliest began at 7:35 a. m. and the latest ended at 4:40 p. m.

The accompanying chart (Text-figure 1) shows the attentiveness of both birds as observed during incubation.

On the nest, the Chestnut-sided female preferred to face south, and only occasionally turned around in the opposite direction for shorter periods. She was difficult to flush, apparently trusting implicitly in her blending coloration to escape detection. She allowed the observer within two feet before she disappeared over the edge of the nest through a screen of leaves. Possibly because she became used to my visits, this bird was never seen "feigning injury," but if she found herself disturbed while within sight of the nest she flitted about and scolded vigorously until the object of her displeasure retired to appropriate distance.

A few minutes before the female was ready to leave after a period of incubating, she became markedly restless. She would shift about, shake herself, look around, as if she were debating with herself the exact instant when she ought to go. Then she hopped up on the rim of the nest and ducked through the screen of leaves on the east side. She flew low through the underbrush, generally to her favourite haunt, the mossy place under the fir trees.

The west side of the nest was open, but only three times was she seen leaving by this exit. On the first occasion she was apparently


CHESTNUT-SIDED WARBLER
ATTENTIVITY DURING INCUBATION
June 8 1st Day. On. Time 185 min Temp 69°-68° F
June 9 2nd Day On. Time 136 min Temp 76° F
June 12 5th Day On Time 126 min Temp 70° F
June 14. 9th Day On. Time 130 min Temp 60°-67° F
June 17. 10th Day On. Time 135 min Temp 79°-72° F
NASHVILLE WARBLER
June 5th On. Time 250 min Temp 65°-70° F
June 7th On. Time 160 min Temp 65° F
LEGEND Solid - interrupted "on" periods. Clear - "off" periods
Shaded - "on" periods. Dotted - interrupted "off" periods

TEXT-FIGURE 1.

excited by the male's presence in the west area, and she went off to where he was, cutting her attentive period short by about ten minutes. Similar behavior is described by Kendeigh (1945).

The bird always returned to the nest in the same way and from the same direction regardless of where she had been. She first flew into a sapling white birch east of the nest, from there to an elderberry bush and down into its lowest branches. Then, with tail spread and wings dropped, she ran sideways up a rod leaning towards the nest and with a light swoop settled on the eggs. Whether she approached silently like a shadow or chipping with head feathers on end, depended upon mood and circumstances, and the time it took her varied, accordingly, from half a minute to three minutes.

The eggs were seen to be turned once during each of the first watches, three times within an hour on the third watch (5th day), and once during the last two watches (9th and 10th days). The bird seemed to use both bill and feet, trampling with the feet and pushing with the bill.

The male took no part in the incubating but would mostly, although not always, be on guard, singing from some perch near by while the female was off the nest. Mousley (1924) spoke of the male feeding the female during incubation, but this was not observed during this study.

The Nashville Warbler female also incubated without being relieved by the male. She had no preferred way of sitting on the nest but would often turn around, facing any direction.

The female's plumage, olive-green on back and shoulders, and faintly bluish on the head, with lemon-yellow eye-rings and under parts, blended extraordinarily well into the colors of her surroundings. In fact, whether she was seen in the earth-brown entourage of the nest or amongst the spring-green foliage of the trees, her coloring seemed to possess chameleon-like properties. Mostly she appeared as a mere outline, guessed rather than defined, until the gleam of a lustrous bird's eye or a movement gave her away. Unlike the Chestnut-sided female, the first hint of a disturbance drove her off the nest. She moved swiftly along the ground with only the light quiver of grass and dead leaves to reveal the course of her passing body. Due to her shyness, her inattentive periods were therefore notably prolonged during the first day of observation, but she soon incorporated the observer with the rest of her natural surroundings and took no further notice.

Because the nest was completely screened in by the dead bracken leaves on all sides except to the southeast, the bird could fly out only in one direction. Undisturbed, she then rose quickly to the top foliage of the trees where she picked her food mostly from under the leaves. Her feeding expeditions seemed to follow a set course, from east and

south around to the north into the tangled woods beyond the aspen thicket. Upon return she invariably approached by flying into a young balsam fir, and down to its lower branches, which reached out towards the nest and along which she hopped, dainty and alert, before she swooped over a foot of open space into the nest.

The male was always in attendance and escorted the female on her rounds and back to the nest. Heard often, chipping or singing, but rarely seen, he moved through the sunlit trees as inconspicuously as his mate. He could be distinguished from her by his much brighter yellow on the breast, his more defined bluish hood and yellow eye-rings, and a darker bill. All his primaries and secondaries were edged with yellow, as if brushed by a beam of sunlight.

The eggs of the Nashville Warblers were bluish-white with cinnamon spots aggregating in a ring at the larger end. Apparently the female used the feet chiefly when turning the eggs, but because she moved so much on the nest it was hard to determine exactly when the operation took place. However, by observing the position of the Cowbird egg in relation to the others, the observer found the eggs changed around once during each of the two days. The last time the female was seen trampling about a great deal and finally she also resorted to pushing with her bill.

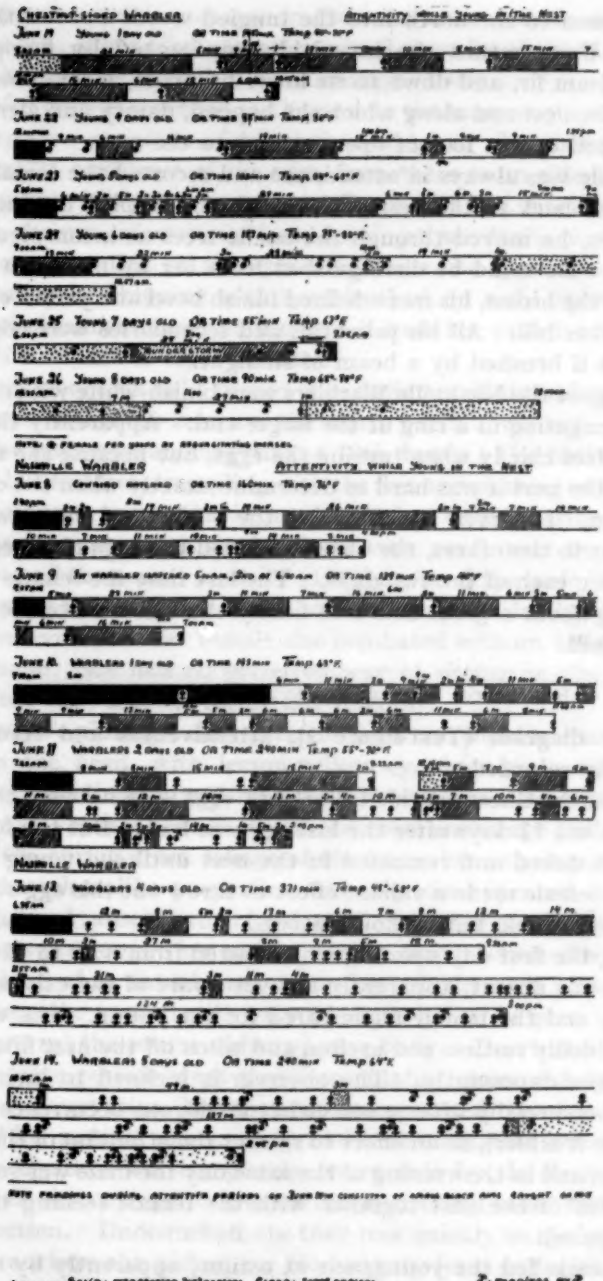
BEHAVIOR WHILE YOUNG WERE IN THE NEST

In the diagram (Text-figure 2), attentiveness and feedings are graphically recorded.

Three of the Chestnut-sided Warblers' eggs were hatched on June 19 at 7:20 a. m., 12 days after the last egg was laid. But the fourth egg was not hatched and remained in the nest until the young had left. Once the female made a valiant effort to throw out this egg so that her whole body shook, but without success.

During the first day's watch, which lasted from 8:20 to 10:45 a. m., the male was absent, apparently not yet aware of the existence of his offspring, and the female alone cared for the young. She was, however, decidedly restless and excited and when off the nest flitted about and chipped incessantly. The observer is inclined to interpret this behavior (especially after a somewhat analogous occurrence with the Nashville Warbler), as an effort to attract the attention of the inattentive male; and in the evening of the same day the male was seen sitting on the rim of the nest together with the female feeding the young (J. M. Speirs).

The female fed the young, one at a time, apparently by regurgitation. After feedings she yawned and smacked her mandibles in a



TEXT-FIGURE 2.

curious way, possibly a reaction following regurgitation. This ceased later after, it may be assumed, she became accustomed to this manner of feeding. She approached the nest in the same fashion as during incubation. She perched on the west rim of the nest as she offered food to the young.

Feeding by regurgitation was abandoned gradually and replaced by direct feeding. On the fourth day the female was seen regurgitating only once. Whether the male at any time fed by regurgitation could not be determined, as the nesting study was interrupted during the second and third days. The food was placed in the open bill of the young and if the small one had any difficulty, the parent birds often picked up the morsel again and replaced it, presumably in a manner more convenient for swallowing.

After the first day the male settled down to his parental duties with energy and efficiency. His rate of feeding, as the charts show, was considerably higher than the female's, partly because much of her time in the beginning was taken up with brooding. After the fifth day, however, the female spent a great deal of time during her increased inattentive periods preening and feeding herself, more and more rarely bringing food to the young.

The male did not help with the brooding. He approached the nest from the same direction as the female, through the elderberry bush, but being always in a hurry spent less time over it. He perched on the north rim of the nest and departed by the open west exit. The female's brooding periods usually ended with the arrival of the male. Sometimes both parents arrived at the nest simultaneously. On such occasions the male retired until the female finished feeding, whereupon he approached and fed while the female watched. Once both parents fed a young each at the nest together. The young were at first fed smaller insects, mosquitoes, and small moths, which gradually were increased in size—for instance, large green caterpillars and huge dragonflies. The latter sometimes proved quite a problem to dispose of both for parents and young.

On the fifth day the young began to show pinfeathers and on the sixth their eyes began to open and their wing-bars to show. On the eighth day the young were fully feathered.

During the last days the female merely sat on the rim of the nest in a quasi-brooding position during her much abbreviated attentive periods. On the seventh day, however, the nest was watched during a thunderstorm, at the height of which the female remained properly brooding for 28 minutes. Towards the end the male arrived with food, and the young, sensing or hearing him, stuck out their heads

from under the mother who lifted herself to allow one of them to be fed. She then settled down again until the downpour subsided.

In the Nashville Warbler nest, the Cowbird was hatched in the afternoon of June 8 and one of the warbler eggs was missing. The young Cowbird was naked except for some tufts of grey natal down. The giant lay draped over the small eggs of his host.

The female did all the feeding of the young Cowbird which she regaled with small moths and mosquitoes by direct feeding. During her attentive periods she cleaned the nest thoroughly, eating the droppings.

The first of the warbler young hatched at 4:55 a. m. on June 9, a tiny mite compared with the Cowbird. It was adorned with dark, almost black, natal down in patches; for the rest it was naked. After attending to the Cowbird, the female ten minutes later settled down to eat the eggshell. She did this in two portions, first one half, then the other, and it took her six minutes of much chewing and gasping to get it down. At 6:47 a. m. she began eating another eggshell from the second young just hatched. It took her exactly the same time to dispose of this shell as the first one.

Again this day the female was alone caring for the young. She fed the Cowbird six times and her own young twice. During the brooding she seldom sat quietly for any length of time but busied herself cleaning and rearranging the nest, after which she shook out her wings over the young and settled down only to begin all over again five minutes later.

When off the nest she, like the Chestnut-sided Warbler, chipped and flitted about notably more than usual, a behavior in which, it is interesting to point out, she did not indulge after the Cowbird was hatched. The male was heard singing in the north area and once he came close but flew away again. He was a nervous individual under all circumstances, and it is evident that my presence was a cause for his non-coöperation.

On June 10 the third warbler young had hatched. The female fed her own young six times and the Cowbird six times out of 16 feedings. All feedings were offered directly and consisted of small flies and small white caterpillars. Only one young was fed at a time. On one occasion she attempted to feed her own young but, receiving no response, she gave the morsel to the Cowbird.

Again this day the male kept himself at a distance. It became clear, however, that by now he was normally coöperating with the female which came and went without chipping or fuss. Once the male even came close to the nest with a caterpillar in the bill, but failing to master his nervousness, he ate it and departed.

On June 11 the nest was under observation for four hours in two periods—one in the morning and the other in the afternoon. During this time the young were fed five times by the male which was now beginning to overcome his shyness, and 31 times by the female. Of these feedings, 26 were given to unidentified young while, of the remaining ten, five were given the Cowbird and five to their own young. Once the Cowbird begged but was refused and the food was given to their own young. Another time the Cowbird refused and the food was again given to their own young.

By this time the parent birds were collecting several insects (larvae) on one trip. The food was crammed down the throat of the young whereupon the parent sat back and watched. Should further help be required the adult bird thrust and pushed the food deeper down into the young one's gullet until the last gulp was managed, a rather awful-looking operation.

The approach of both birds was the same as the female's during incubation, through the balsam spruce. When leaving, both birds flew directly into the upper branches of the trees for their foraging.

During the brooding periods, in which the male took no part, the female was ever busy tidying the nest and cleaning herself and the young. On several occasions she was seen energetically tugging and pulling at a wing or a leg of her own young, which were often completely buried under the sprawling Cowbird and in acute danger of suffocation, until she seemed satisfied her weaker one once more got his periscope aloft.

On June 13, when the warbler young were four and the Cowbird five days old, the nest was under observation three hours in the morning and three hours and five minutes in the afternoon. During this time the young were fed 72 times, 8 times by the male and 64 times by the female. Of these feedings, 15 were seen to be given to the Cowbird and 17 to their own young. The parents were now feeding more than one young at a time and they often brought so much food back from one trip that it sufficed to divide between all four. On three occasions both the male and the female were seen to withdraw part of the food already given to the Cowbird to offer it to their own young and once the Cowbird begged but was refused.

When feeding, the female often went right into the nest and stood on the Cowbird while tending her own young. The male, which in the course of the day became all but oblivious of my presence, stood daintily on the rim while feeding. Both birds worked silently—the female very fast, darting in and out; the male slower. When they met at the nest, either one retired until the other finished feeding; there was no

room for both to feed at the same time although they often were at the nest together. During the morning, when the temperature was between 54 and 55 degrees Fahrenheit, the female brooded the young, but in the afternoon, when the temperature rose to 62 degrees, she gradually gave it up.

On June 14 the nest was observed continuously for four hours. The Cowbird measured 2 11/16 inches to the 1 1/16 inches of the Nashville young. On all, the pinfeathers were beginning to grow out of the skin on the wings though still in sheaths. The Cowbird's eyes were fully open, and it emitted a note when touched and clung strongly to the nest-lining with its feet. The eyes of the Nashville young were showing opening slits and one of them manifested a tendency to become a runt.

During the observation, the young were fed 62 times—17 times by the male and 45 times by the female. The Cowbird was seen being fed 33 times and their own young 31 times. (The discrepancy in the totals is due to both Cowbird and Nashville young quite often being fed at the same time.) The Cowbird made itself very prominent, stretching its long neck above the others and fluttering its wings. The young were mostly given large white and green larvae. As the parents came in with their bills full of food, they would put it in the open bill of one young, extract part and give it to the next, withdraw part of that again and give to a third, and so on.

The female did no brooding during this day, but she sometimes remained in the nest, once for three minutes, to arrange and clean and pull one of her young from under the Cowbird. On two occasions she picked up a stick that had become detached from the nest structure, and carried it away five to 15 feet from the nest where she dropped it from a tree.

On June 15 no continuous observation was done; only a short visit. The eyes of the young warblers were fully opened. The sheaths of their pinfeathers were also opening and the feathers showing. The Cowbird filled the nest and followed the movements of the observer with its eyes.

LEAVING THE NEST

The Chestnut-sided Warbler female and two of the young were banded on June 26 when the young were eight days old. Unfortunately the day chosen was a little too late and the third young left the nest and could not be found again. The young were put in a trap, and the female immediately entered and was banded. The suspicious male kept himself at a distance, scolding vigorously. The two banded

young stayed in the nest when replaced. The next morning, at 11:00 o'clock, the last of them left and was seen making a bold flight of approximately 20 to 25 feet. Both parents were in attendance and the young were heard giving food-calls, *chetiit, chetiit.*

After the young had flown, the parents seemed to divide the family between them so that each of them cared for certain individual fledglings. This conclusion is based on the observation that during this period the male and the female were no longer seen feeding the young together, and once when the male happened to approach the banded female she chased him off, and he returned to where his banded young sat waiting. Twenty-eight days after leaving the nest, the female and one young were seen for the last time about 300 feet from the nesting site. The young was still begging and occasionally being fed.

The Nashville young and the Cowbird were banded on June 16 when the Cowbird was eight and the warblers seven days old. None of the young left the nest and the female was afterwards seen continuing feeding. No attempt was made to capture the adults because of the generally nervous disposition of the male and for fear of interrupting the nesting in its last stages.

The Cowbird measured 3⅛ inches. It was fully feathered and the tail feathers were beginning to grow out. It emitted loud cries while being banded. The commotion attracted the female which came fluttering along the ground 'feigning injury.' Of the warblers, No. 1 measured 1⅝ inches; No. 2, 1⅞ inches; and No. 3, 1¾ inches. All had the beginning of a tail showing and dark gray feathers on the wings, back and head, and yellow down on the breast. They emitted weak calls.

On June 17, at 10:30 a. m., all the young had left. This seemed very early for the still rather small and helpless warblers. But the nest was intact and there was nothing to indicate that their departure had not been normal. Furthermore, both adults were in the vicinity during the 20 minutes the observer remained. They chipped and scolded though no answering calls were heard from the young. It was the last time this particular pair was observed with certainty.

NEST DEFENSE

The Chestnut-sided male was once seen engaged in a territorial fight, on the first day of incubation. He then fought another male Chestnut-sided Warbler near the west boundary of his territory, about 50 feet from the nest. Apart from this, all other engagements were with other birds trespassing too closely to the nest, such as the Least Flycatcher and the Mourning Warbler. During incubation the male was the

most active defender while the female appeared rather to resort to 'freezing.' The male's tactics consisted of stalking the intruder; he flitted from twig to twig in silent pursuit until the other either departed peacefully or was chased off in a sudden burst of aggression. After the young were hatched, the female would take action under pressing circumstances when the male was absent.

During the two days of observation while the Nashville Warbler was incubating, occasion requiring nest defense was lacking. But on June 13, when the warbler young were four days old, there was a short and sharp melée above the head of the observer, in which a pair of Redstarts, a Chestnut-sided and a Canada Warbler male took part with both Nashville Warblers as defenders, the female acting with more nerve and dash than the male. The female was twice observed 'feigning injury,' the first time when the nest was discovered (M. Halliday) and the second time when the young were being banded.

Sanitation of the Nests

The Chestnut-sided female was seen picking up droppings eight times in the period from the first to sixth days, all of which she ate. After that, although she might still be looking for them, her mate apparently relieved her of this chore. During the total time of observation the male was seen picking up droppings 12 times. Of these he carried away ten and, on the last day, he ate two. Most of the droppings he caught directly as the young expelled the fecal sacs.

The Nashville female took upon herself the greater part of the sanitary duties and was only occasionally helped by the male. During the total time of observation she picked up droppings 57 times to the male's seven. Of these seven, the male carried six away, carefully depositing two of them on a twig 15 to 25 feet from the nest, and one he gave to the female as both were sitting on the rim of the nest. Of the female's 57 droppings, 38 were eaten and 19 carried away including the one she received from the male. She ate droppings from the first to the last day but began carrying away some when the warbler young were two days old. Of those carried away she was seen depositing four on a twig 15 to 35 feet from the nest, carefully wiping her bill afterwards.

Song

The Chestnut-sided male was observed singing from several favorite perches on preferably bare twigs high up in the trees surrounding the nest. Dr. Kendeigh's observation of the Chestnut-sided males singing "successively from one, then another [perch], until he completes the

round of his possessions" describes accurately the behavior also of this bird. The variations of the Chestnut-sided Warbler's songs have been so aptly rendered by writers such as Saunders (1935) and Lynds Jones (1900) that this observer will not attempt an interpretation of her own. Suffice it, therefore, to remark that the songs of the bird in question seemed typical of the three variations most commonly heard. This male's most vigorous singing was heard when he sat on guard at the nest. (But in making this statement it must be noted that the observer did not listen to any of the pre-nesting singing.) During such an occasion he was heard giving 20 songs in five minutes and at another time one song every three seconds. From the time the young hatched the male's singing declined. He would sing a song or two while foraging, perhaps announce his arrival with another song and his bill full of food, and then sing again after departure. But after the young left the nest he gradually ceased singing altogether.

Before the Nashville Warbler's nest was discovered, the male was observed for about a week singing loudly and often in the territory surrounding the nest, particularly in the north area, during the mornings and early forenoons. On several occasions the bird was observed sitting in the tops of the scattered spruce trees, apparently his favorite singing perches. When continuous observation began during the latter part of incubation, it was noticed that the male sang both in the mornings and afternoons, though more frequently in the mornings. He would then give up to four songs a minute, but his periods of continuous singing were always rather short. His songs were of but one variation, corresponding to the second perch-song mentioned by Chapman (1940) as described by Thayer in 'Warblers of North America.' The flight-song, of which this writer also spoke, was not heard, at least not noticed as a flight-song. After the young were hatched, the male sang less often until the day the young were discovered to have left the nest, when he was heard singing more vigorously and sustainedly than at any other occasion.

The call-note of the Nashville Warblers was a short, sharp *tsik*. The female's seemed to the observer somewhat sharper in quality than the male's.

DISPLAYS

None of the courting and mating displays were observed in either species. The Chestnut-sided male was seen displaying a few times after incubation began and the female reacted by chasing him. Both the Chestnut-sided Warblers always approached the nest with spread tail and dropped wings.

The Nashville Warbler male was never seen displaying. The only way in which he was observed to betray emotion was by teetering his tail up and down. This was especially noticed at meetings with the female. She, on the other hand, was twice seen flying out to the male with spread tail and trembling wings, to which he reacted by wagging his tail up and down.

SUMMARY

The results of these two nesting studies show many points of dissimilarity in the behavior of a Chestnut-sided and a Nashville Warbler, some of which are:

1. The Chestnut-sided Warblers hang their nests in bushes at low elevations while the Nashville Warblers are ground-nesting birds.

2. During incubation, the male of the first species here studied sat on guard at the nest while the female was absent, and did not escort her on her foraging. With the Nashville Warblers the opposite occurred.

3. The attentive periods of the Chestnut-sided female during incubation showed a definite increase in length towards the end. In the case of the Nashville, observation did not evidence a similar trend. Its absence may, however, partly be accounted for by three circumstances, two of which obviously affected the normal course of events: (1) insufficient data for proper comparison; (2) the marked nervousness of the female at first; and (3) the hatching of the Cowbird earlier than the warbler young.

4. The Chestnut-sided female incubated and brooded almost motionless and facing one preferred direction, while the Nashville Warbler favored no special position and was constantly active on the nest, particularly when brooding.

5. When the young were hatched the Chestnut-sided male assumed the lion's share of their care, both in feeding and sanitation, with good assistance from the female up to the sixth day, after which she left the sanitation entirely to the male and also decreased her rate of feeding. At the Nashville nest, on the other hand, the female did the greater part of the work, both feeding and sanitation, with some help from the male.

6. In the matter of disposing of the fecal sacs, the Chestnut-sided male carried away most of them, only on occasion consuming a few, while the female ate all she was seen to pick up. The Nashville male also carried away the droppings but ate none, while his mate ate all droppings the first three days and thereafter continued to eat about half of them and carry the rest away. Both Nashville Warblers were

seen depositing droppings on twigs and it seems likely that most, if not all, of the droppings carried away were disposed of in this manner although it could not be ascertained by following the birds every time.

7. The Chestnut-sided Warblers apparently fed their young by regurgitation during the first days and then by direct feeding, never offering food to more than one young at a time. From the first the Nashville Warblers fed their young directly, adapting the morsels to the capacity of the young. During the first days they fed only one young at a time, but later fed several or all the young from food collected during one foraging trip.

8. The food of the Chestnut-sided young consisted mainly of winged insects while that of the Nashville young comprised chiefly larvae.

9. In the nest defense the Chestnut-sided male was most active, but with the Nashville Warblers, both birds took part and, in this particular case at least, the female was probably more energetic than the male.

10. The points in common of the two species are:

(a) The females incubated and brooded without assistance of the males.
(b) Both males sang from favorite singing perches during the early part of their vocal season.
(c) As soon as the young were hatched, both females apparently sought to make the males aware of the existence of their offspring by intensified chipping.
(d) The males and the females of both species always approached the nests in the same set manner.

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NOTES ON BIRDS OF SANDWICH BAY AND VICINITY, NEWFOUNDLAND LABRADOR

BY VIRGINIA ORR

ALTHOUGH there seems to be an abundance of annotated lists of Labrador birds, for the most part they represent, for reasons of inaccessibility, a transient sort of birding which can not present a clear picture of the avifauna. In time these lists will accumulate and be consolidated into a comprehensive work which will cover more than occurrence and a few fleetingly noted facts.

In two trips, made in 1938 and 1946, the author covered an area touched lightly by Grayce (1947), Loomis (1945), and Gross (1937) and more completely by Austin (1932), namely, Sandwich Bay, with brief excursions to nearby Gannet Clusters and Mason's Island in Hamilton Inlet. Observations were confined to the first three weeks in July both years, and only those data are included in the list which appeared to augment information already at hand.

In order to understand the multitude of discrepancies incurred by competent ornithologists while covering the same territory, one must realize that ecologically the north and south sides of a small hill in Labrador may be as far apart as the Carolinas and Maine.

For instance, a pocket of spruce hidden in a wide slope of boulder-strewn tundra changes the bird population from Arctic-nesting Pipits (*Anthus spinoletta rubescens*) to forest-loving Ruby-crowned Kinglets (*Regulus calendula calendula*).

For this reason a brief geography of each locality mentioned is included:

Cartwright, which was the author's headquarters, is a small town of thirty-odd families on the south shore of Sandwich Bay, seven miles from the inlet. Most of the land is boggy and covered with an impenetrable spruce forest ten to fifteen feet high. There are several grassy swamps and barren hills.

Main Tickle Point juts toward an island from the north shore of the bay five miles from the sea. At most tides the water runs in rapids and, at this season, is filled with sea-run brook trout. The point itself is narrow, covered with characteristic tundra plants and scattered boulders and punctuated by numerous stagnant pools. It is backed by a sizable spruce forest.

Eagle River, with two other large rivers, the Paradise and Great Bear, forms the head of Sandwich Bay. Most observations were made five to six miles upstream in fresh water, approximately twenty-eight miles from the sea and the influence of the Labrador Current. The

boggy land is covered by extensive spruce forests which have been lightly logged in some places. Small birches, alders and willows line the river bank. The river, within a mile, resolves itself from a wild rapid that falls ten feet in the course of a few yards to a swift but quiet stretch extending to another torrent that thunders on to huge rocks.

Gannet Clusters are small islands rising in sheer cliffs from the sea about ten miles off the mainland. They vary in size from a few to thirty or forty acres and their peaty tops are covered with tundra plants. A few boast fresh-water pools.

Mason's Island, two acres in extent, is low-lying tundra and swamp-covered. There is one salt pond surrounded by a sedge marsh and a coarse sand and pebble beach. It is situated about three miles inside the wide-mouthed inlet near the south shore.

ANNOTATED LIST OF BIRDS

EUROPEAN CORMORANT, *Phalacrocorax carbo carbo.*—A cormorant which I feel quite sure was this and not the Double-crested species was seen in the vicinity of the Gannet Clusters, July 18, 1946. I could not, however, find any on the cliffs.

BLACK DUCK, *Anas rubripes.*—Found on most of the large rivers and sheltered bays. Fishermen informed me that this was the "best eating" duck on the coast.

BALDPATE, *Mareca americana.*—A fisherman told me that this bird was frequently found in the marshes back of Cartwright in migration. I found none in July.

GREEN-WINGED TEAL, *Anas carolinensis.*—Residents of Cartwright have found this bird in spring and fall on the marshes back of town. They said that it was "uncommon."

AMERICAN GOLDEN-EYE, *Glaucionetta clangula americana.*—Found singly or in pairs about the outer ledges of Sandwich Bay. Although I surveyed all birds for prospective Barrow's Golden-eyes (*Glaucionetta islandica*) they were all the present species.

EIDER, *Somateria mollissima.*—I made no attempt to differentiate between the Northern and American Eiders as they were seen briefly in large flocks or under difficult conditions. A flock of forty adult males and three brown birds (females or immatures) were seen near Cartwright on July 6, 1946, and scattered birds were seen almost every day. Two female eiders which I felt to be this species were flushed from nests, one on the Gannet Clusters and the other on Mason's Island. The former nest contained three eggs on July 18, 1946, and the latter one pipped egg on July 19, 1938. There were ten female or immature birds swimming off the ledges at the Gannets July 18, 1946.

WHITE-WINGED SCOTER, *Melanitta fusca deglandi.*—A flock of over two hundred, largely males, was seen in Hamilton Inlet on July 20, 1938. There were scattered individuals on Sandwich Bay.

SURF SCOTER, *Melanitta perspicillata.*—Several birds were seen frequently on Sandwich Bay, particularly around the inner islands and Main Tickle.

AMERICAN SCOTER, *Oidemia nigra americana.*—A few were seen with Surf Scoters in the tide rips near Cartwright and Main Tickle.

AMERICAN MERGANSER, *Mergus merganser americanus.*—Although the Red-breasted (*Mergus serrator*) is the common Labrador merganser, a male and two females of this species were found on a quiet stretch of Eagle River, July 13, 1946.

AMERICAN ROUGH-LEGGED HAWK, *Buteo lagopus s.johannis.*—A dark individual was seen frequently at Cartwright in 1938 and a pair showed great interest in a crag across the Eagle River from the Hudson Bay Company camp.

OSPREY, *Pandion haliaetus carolinensis.*—Seen at Cartwright in 1946.

SPRUCE GROUSE, *Canachites canadensis.*—Fairly common in the forest behind Cartwright where it is hunted extensively. A female and at least eight half-fledged chicks were found in fairly open woods near the hospital at Cartwright on July 7, 1938. The bird was scarcer in 1946 according to the townspeople.

SEMIPALMATED PLOVER, *Charadrius hiaticula semipalmatus.*—Abundant on Mason's Island where a nest and three eggs were found July 19, 1938.

SPOTTED SANDPIPER, *Actitis macularia.*—The gravel beaches of Sandwich Bay are seldom without the Spotted Sandpiper during July. Downy young were found on Mason's Island, July 19, 1938, and five newly hatched birds were discovered in a marshy bit of tundra at Main Tickle Point, July 8, 1946.

RED PHALAROPE, *Phalaropus fulicarius.*—Two females in full breeding plumage were observed swimming well off a rocky islet near the mouth of Sandwich Bay during a northeast storm, July 19, 1946.

NORTHERN PHALAROPE, *Lobipes lobatus.*—A pair was seen feeding in the salt pond on Mason's Island July 20, 1938. The male disappeared into the thick growth of sedges at one end, but a careful search did not reveal him or a nest. The birds were not shy while feeding and I felt that one would have had to approach the male very closely to flush him from such good cover.

GREAT BLACK-BACKED GULL, *Larus marinus.*—A visit to one of the smaller Gannets, July 18, 1938, revealed the surprising concentration

of Black-back nests noted by Gross. A search covering a little more than a quarter of an acre disclosed five nests containing three and two eggs each, and three flightless, half-grown young that were extremely difficult to see as they crouched among the lichen-splashed boulders.

A trip to one of the larger islands of the group on the same date in 1946 resulted in the finding of only two deserted nests, and although there were several adults diving at us, we could find no young. Perhaps the presence of Snowy Owls had something to do with their scarcity on this particular island.

ARCTIC TERN, *Sterna paradisaea*.—The only terns in Sandwich Bay seen closely enough to be positively identified were of this species. They frequented the tide rips at Main Tickle and Cartwright and seemed to be concentrated on a dry reef near Cartwright.

GREAT HORNED OWL, *Bubo virginianus*.—One was seen perched on a flag-pole at the Grenfell Mission at Cartwright July 5, 1946. It was, supposedly, a frequent visitor there.

SNOWY OWL, *Nyctea scandiaca*.—There were at least three of this species on one of the larger of the Gannet Islands and though we flushed them several times in attempting to photograph them, they never left the island. From wing-quills, bits of vermilion skin and bone-fragments in two pellets, I surmised that the owls had fed upon a Puffin and a Horned Lark both of which were abundant.

It would be of interest to know how many owls were on the Clusters; also whether the bird recorded by Grayce was in addition to my three, for his record was made July 9 and mine July 18, 1946.

AMERICAN HAWK OWL, *Surnia ulula caparoch*.—Seen frequently in the evenings flying across the open marsh and hillside near Cartwright, much to the dismay of the Gray-cheeked Thrushes and Canada Jays that scolded them sharply. They (the owls) often rested near the tops of clumpy spruces and when they hunted they seemed to work as a team. They uttered a hoarse, cat-like *kee-er* in flight or when perched.

EASTERN BELTED KINGFISHER, *Megaceryle alcyon alcyon*.—A pair was seen on the Eagle River July 13, 1946.

ARCTIC THREE-TOED WOODPECKER, *Picoides arcticus*.—A pair of these birds was found on a lightly lumbered hillside above the Eagle River. They were quite fearless and were observed from close range for several minutes, July 13, 1946.

CANADA JAY, *Perisoreus canadensis*.—Many slate-colored young birds were seen about Cartwright and Main Tickle Point in 1946 although few adults were in evidence. In 1938, however, it was the adult birds that seemed the commoner. A fisherman showed me a nest and eggs he had taken in the early spring (there was considerable

snow on the ground) from a six-foot-high crotch in a black spruce near Cartwright.

ACADIAN CHICKADEE, *Parus hudsonicus*.—A small flock (possibly a family) was seen on the hillsides above the Eagle River, July 13, 1946.

HERMIT THRUSH, *Hylocichla guttata faxoni*.—One bird was seen under favorable conditions on the Eagle River, July 13, 1946. Perhaps this thrush is not as scarce as records would indicate; birding in these inland localities is difficult due to the impenetrable nature of the forests.

GRAY-CHEEKED THRUSH, *Hylocichla minima*.—The common thrush around Cartwright resides in spruce clumps at the edges of fields, clearings, etc. where it is one of the first birds to rise to the top of a tree and roundly scold any intruder.

RUBY-CROWNED KINGLET, *Regulus calendula calendula*.—Found in the thick spruce forests behind Cartwright and on the Eagle River.

PIPIT, *Anthus spinoletta rubescens*.—Abundant on every patch of tundra from the Gannet Clusters to Main Tickle Point and the hills above Cartwright. A nest with four young about two days old was found on Mason's Island, July 19, 1938.

YELLOW WARBLER, *Dendroica petechia*.—Common among the small willows and alders around Cartwright and on the banks of the Eagle River.

BLACK-POLL WARBLER, *Dendroica striata*.—One of the commonest birds around Cartwright and Eagle River. A nest and five eggs were found in a low, thick clump of black spruce, Cartwright, July 5, 1946.

WATER-THRUSH, *Seiurus noveboracensis*.—Found commonly along the alder-lined banks of the Eagle River.

WILSON'S WARBLER, *Wilsonia pusilla pusilla*.—Several were seen around the reservoir behind Cartwright, 1938.

PURPLE FINCH, *Carpodacus purpureus purpureus*.—A pair of these birds was resident about the reservoir behind Cartwright in 1938 where I had several good looks at them, particularly the male which sang, frequently, from the top of a low spruce. I could not locate any nest.

PINE GROSBEAK, *Pinicola enucleator*.—Found in the lightly lumbered portion of the forest near Cartwright.

REDPOLL, *Acanthis flammea*.—Most abundant in the more open portions of the country where scrubby spruce bordered open tundra, swamps or shore-line.

SAVANNAH SPARROW, *Passerculus sandwichensis*.—Found commonly on the open tundra or artificially formed fields (cleared land) at Cartwright, Main Tickle Point, Gannet Clusters and Mason's Island. A nest with four well-grown young was found at Cartwright, July 11, 1946.

LINCOLN'S SPARROW, *Melospiza lincolnii lincolnii*.—Less seems to be written about this than about any other Labrador sparrow even though it be one of the most common in transition lands between deep forest and barren tundra. At Cartwright any thicket held at least one pair of these birds which scolded all intruders with a metallic *chink*.

A nest containing three newly hatched young was discovered on the ground at the base of a small, dead spruce, well hidden by exposed rootlets and deciduous growth, July 5, 1946. The parent allowed me to approach within two feet before slipping off the nest and running back into denser growth. Subsequent visits proved that no matter how frightened, the bird never flew away directly, but ran along the partially covered tunnel for several feet before taking wing. It used the same route when bringing food to the young.

The fledglings left the nest in a flightless condition on the twelfth day after discovery.

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LIFE HISTORY OF THE GOLDEN-NAPED WOODPECKER[1]

BY ALEXANDER F. SKUTCH

THE Golden-naped Woodpecker (*Tripsurus chrysauchen*) is one of the many noteworthy birds endemic to the region of heavier rainfall and dense, lofty rain-forests which in southwestern Costa Rica and extreme western Panamá interrupts the savannas, thorny scrub and low, open woodland typical of the Pacific Coast of the North American continent, except at high latitudes. It is a small woodpecker of about the size and much the appearance of one of the smaller species of the genus *Centurus*, with which this and related forms are sometimes

[1] This paper was written while the author held a Fellowship of the John Simon Guggenheim Memorial Foundation.

united. But it is far less extensively and conspicuously barred than most species of *Centurus;* and the markings of the head, which in most woodpeckers alone serve to distinguish the sexes, are of a type very distinct from those of the larger and better known genus.

In both sexes of the Golden-naped Woodpecker the back, scapulars and wing-coverts are deep black, with the rump and upper tail-coverts white, and with broad streaks of white along the middle of the back. The tail and the larger wing feathers are brownish-black, the latter with some white markings. A broad band of glossy black, beginning in front of the eye, extends back along the sides of the head and neck to meet the black of the shoulders, and there is usually a white spot or streak behind the eye. The anterior under parts are yellowish-gray; the abdomen largely scarlet; the sides, flanks and under tail-coverts are broadly and irregularly barred with black and whitish. The male has the forehead and hind neck bright yellow, the crown and occiput brilliant poppy red or scarlet-vermilion. The female has no red on her head, but a broad band of black across the crown separates the duller yellow of her forehead from that of her nape. In both sexes the bill, legs and feet are blackish and the eyes dark.

In Costa Rica these handsome woodpeckers range from near sea level up to almost if not quite 4,000 feet. In the Térraba Valley they are most often met about the edges of the clearings which in this region encroach increasingly upon the lofty forests, and according to Carriker (90: 586) among scattered trees of the open 'sabanas' about the Indian settlements in the middle section of the valley. In the forest itself they prefer to stay high in the tree-tops where they are seldom seen. They live throughout the year in pairs or family groups which, in my experience, never contain more than five individuals. They are non-migratory and apparently never wander far from the hole which at all seasons is their nightly shelter. Their flight is swift and undulatory and rarely long continued. When not persecuted they are tame and confiding in the presence of man. Their call is a resonant *churr* of a peculiar, pleasant quality, often uttered as the birds bow deeply; and both male and female beat a rapid tattoo.

FOOD

Like other woodpeckers, the Golden-napes are constantly chiselling into decaying trunks and branches, where they uncover lurking grubs and beetles. They capture insects on the wing; and on wet evenings when the winged brood of the termites fills the air, they rise above the tree-tops and twist and loop with admirable skill as they capture one after another of the fluttering insects. They eat many fruits, from the

dry, green pistillate spikes of the cecropia tree to sweeter and more succulent bananas and well-ripened plantains. It was after a fortnight of almost continuously wet and gloomy weather during the second half of October, 1944, that the Golden-napes first visited the feeding-shelf beside my house, fifty yards from the edge of the forest, where for nearly two years these fruits had been daily displayed for the benefit of any bird that cared to eat them. Dark, wet days drive many birds from the woodland into adjoining clearings; and during this unusually long-continued period of rain and gloom, my feeding-shelf was crowded with a multitude of birds of a dozen species as it never was before and has rarely been since that memorable rainy spell.

On the afternoon of October 27, I for the first time saw one of these woodpeckers—a female—standing on the board in the guava tree and eating bananas. A male and another female clung to the branches close by, but feared to venture upon the table—at least as long as I was in view. Although all the other visitors gathered on the board in many-colored crowds of mingled species, while the woodpecker ate, the others, from big Buff-throated Saltators and Baltimore Orioles to little Blue Honeycreepers and wintering Tennessee Warblers, waited respectfully at a slight distance. This was merely because the woodpecker was a stranger of whose temper they were uncertain. Little by little they lost their distrust and began to eat beside her. Despite her formidable bill, they found her gentle; she pecked at a fellow-diner only if it crowded her very closely. Most of the other visitors, down to the smallest, were also careful to preserve a narrow free space around themselves.

After her first visit to the table, the female Golden-nape became a constant attendant, and gradually the other members of her family formed the habit of eating here, too. Soon two males and a female were making frequent visits. By the beginning of December, three males and two females were regular visitors. They all slept together in the same hole in the top of a tall, dead tree at the edge of the forest on the ridge behind the house, scarcely a minute's flight from the feeding-shelf. Sometimes they would spend much of the day clinging, all five together, to the tall, pole-like trunk of a young flame-of-the-forest tree growing close by, descending to the board from time to time as they grew hungry. They would approach the bananas by flying from branch to branch of the guava tree that held the table. One—or possibly more than one—of the males would bow deeply, at the same time churring loudly, as he clung to the boughs on his way to the food. After standing on the board and eating freely of the banana or plantain spread there, they flew back to the flame-of-the-

forest tree to cling idly until they had digested their latest meal and were ready for more. They were soon less shy, and allowed me to approach them more closely, than many of the smaller passerine birds that attended the table. Sometimes in the evening they lingered close by the food board until they were ready to fly up to their dormitory on the ridge. These daily visits of the woodpeckers continued until the end of February, 1945. I was absent from the farm during the first week of March, and after my return no longer saw them at the table, although the five continued to sleep in the same place for several weeks longer, and after that the mated pair nested in a neighboring trunk. They were apparently now finding foods more attractive to them in the forest.

The Golden-naped Woodpeckers were not again seen at the table until November 19, 1945. On this date a male and a female came repeatedly to eat bananas. I believe that they were the parents of the family that at the beginning of the year had been such regular attendants. Their attempts to rear progeny during 1945 had been unsuccessful. The two clung to the flame-of-the-forest tree between visits to the table, as they had formerly done in company with their three grown offspring of the previous year. On December 28, I moved the feeding-shelf to a taller tree in front of the house, seventy feet from its former site; the domestic chickens had discovered that they could fly up to the board in the guava tree and with their voracious appetites left no bananas for the smaller wild birds. An hour after the board was moved, a male Golden-nape arrived, seemed greatly upset at not finding food where he was accustomed to an unfailing supply, showed his displeasure by churring much, then flew away without going to the table in its new situation. Meanwhile tanagers and other birds had discovered its changed location and were visiting it freely; and that same afternoon the Golden-nape was eating there, too. The woodpecker pair found the new position of the board most convenient. It was supported on one side by a long ascending branch. After eating they would merely climb up the branch and cling among the foliage until they were hungry once more, when they would climb down, tail first, for another meal, repeating this again and again. Their visits continued until early March, 1946, then were completely discontinued, as during the preceding year.

After this I did not again see Golden-napes at the table until June 15, when the pair arrived with a full-grown young male. The adult male went directly to eat bananas, as though he felt quite at home on the board; but the youngster approached with much hesitation and hung once beneath the edge, as though reluctant to stand on a flat surface.

But at last he plucked up courage, stood on the table and ate, and finding the bananas good, returned several times thereafter. During July, August and September of this year I was absent from the farm. When I returned in October, the three Golden-napes were occasionally seen at the table. They continued their visits until at least the following March 6, 1947, but were not such constant attendants as during the two preceding years. Thus during three years Golden-naped Woodpeckers came to my feeding-shelf to eat bananas and plantains during the non-breeding season, especially its later part, but not during the nesting season, even when their nest was only a minute's flight away.

THE HOME CAVITY

In the basin of El General the ample cavities in which Golden-naped Woodpeckers sleep and rear their families are most often carved in fire-killed trees which have been left standing in clearings in the rain forest, close by the forest's edge. It is rare to find a Golden-napes' hole more than 100 yards from the heavy woodland. After a few years these dead trees fall, and the woodpeckers must seek a newer clearing where the settler, to spare himself work with the axe, has left a few of the bigger trees standing, to be killed by the fire he will set as soon as the fallen timber dries. I have found a few nests in tall trees, apparently killed by lightning, a short distance within the edge of the forest, in parts where the trees were less crowded. But I have never seen a Golden-napes' cavity in the midst of unbroken forest; if they occur here, they are probably well up in the tops of lofty trees where they escape detection from the ground. The holes are usually at a good height, between 40 and 100, or possibly more, feet above the ground. Exceptionally they are low; I have records of holes employed for breeding which were only 20 and 25 feet above the ground, and of one used for sleeping only which was 12 feet 8 inches up.

A cavity in a trunk which fell while the woodpeckers were incubating was in hard, sound, dead wood; if the trunk had been as solid at the base as it was at the top where the hole was, it would not have toppled over. The cavity extended one foot below the lower edge of the doorway, and the diameter over most of its length was 4¾ inches. The bottom was neatly rounded and, as usual in woodpecker nests, without any lining of soft material. The round doorway was 1¾ inches in diameter. Unfortunately, the eggs had vanished.

These cavities are used by Golden-naped Woodpeckers throughout the year. Hence if they lose their hole through the falling of a tree, or have it wrested from them by one of the numerous birds of other

families which covet such holes, they may carve a new one at any season. But if they suffer no mishap, they start a new one about the time their young become self-supporting, and carry on the work at such a leisurely pace that it is not ready for occupancy until the beginning of the following breeding-season, some nine months later. Meanwhile the mated pair sleep, with their grown offspring if they have them, in an older cavity close by that which they are excavating. When the new hole is not urgently needed, the male woodpecker is likely to work at it alone; as the breeding-season draws nigh, the female takes an increasingly large share in completing the task. Or if the pair have lost their dormitory, they work together with a will to make a new one at any season.

THE BREEDING SEASON

In the basin of El General, between 2,000 and 3,500 feet above sea level, the breeding season of the Golden-naped Woodpecker extends from late March to June; but I think it likely that any birds attending eggs or unfledged young after May are doing so because they have lost earlier nests. Although it is rare to find a hole so situated that it can be reached for direct inspection, by watching from the ground it is usually possible to learn the approximate stage of the nesting operations. I have records of four nests in which eggs were apparently laid in March, eight in April, three in May, and one in June. A single brood is reared each year; but if the woodpeckers are not successful at their first attempt, they may try at least twice more to produce offspring. I have never seen a full set of eggs. I have known four pairs which reared three young, and two with two young. I have no knowledge of broods with more than three; but since it appears to be a common happening that woodpeckers fail to raise all the nestlings which they hatch—the last and smallest losing out in the competition for food—it may be that Golden-napes sometimes lay more than three eggs.

HISTORY OF MY FIRST PAIR

I believe that the most satisfactory way of presenting a picture of the life of the Golden-naped Woodpecker is by following the history of a single pair. The first pair whose nest I found happened to live within an easy walk of my thatched cabin close by the Río Buena Vista; and I kept watch over their activities for a year and a half, including two nesting seasons, during which their fortunes, as influenced by ouside agencies, varied greatly. In later years I saw enough of other families of Golden-napes to show that my first pair were fairly typical of their kind. One pair which differed greatly will receive

separate attention. But no subsequent pair was followed quite so devotedly as the first. It is the absorbing interest of discovering the general pattern of the life history of a new species, rather than the study of the endless minor variations in the general theme, that calls the bird-watcher from his warm bed before daybreak on raw mornings, and keeps him out beneath drenching evening rains.

The pair of Golden-naped Woodpeckers to which I devoted most attention dwelt in an old abandoned maize field at the edge of the forest on the steep ridge to the east of the Río Buena Vista in the valley of El General, at an altitude of 3,000 feet above sea level. Above the low tangle of bushes and vines which had taken possession of the hillside cornfield towered a number of gaunt, fire-killed remnants of the forest; and these contained crannies and cavities that were the sleeping or nesting chambers of woodpeckers of six kinds, ranging in size from the big, scarlet-headed White-billed Woodpecker (*Phloeoceastes guatemalensis*) to the minute Olivaceous Piculet (*Picumnus olivaceus*), of toucans, woodhewers, tityras, house wrens and martins. But my favorites of all were the Golden-napes, which were held together by the closest family bonds and were the most entertaining to watch.

The Approach of the Nesting-season

The first Golden-naped Woodpecker that I ever saw was a female which on the evening of December 21, 1935, flew out of the neighboring forest and alighted on the top of a very tall and slender barkless trunk standing stark and gaunt near the center of this old cornfield. Here she crept around for a few minutes, uttering a nervous little *churr;* then she backed down the trunk and slipped into an old, weathered woodpecker hole. Once within, she lingered many minutes with her head framed in the round aperture, her light-colored forehead very conspicuous in the dark circle, and at intervals bowed emphatically. As the sky darkened and the neighboring birds became silent for the night, she sank down into the cavity where I could no longer see her.

Next morning I came by the light of a thin crescent of moon to watch the woodpecker of still unknown kind emerge from the hole and learn more about it. A pair of Lineated Woodpeckers (*Ceophloeus lineatus*) were completing a nest-cavity slightly lower in the same trunk, but the male had not yet begun to pass the night in it. While the Golden-naped Woodpecker still looked through her bedroom door in the dim early light, one of the Lineated Woodpeckers arrived and cautiously inspected the new cavity from the outside. Then it drummed a loud tattoo against the resounding dead trunk. This brought the mate flying out of the neighboring forest. The second

Lineated Woodpecker also made a careful inspection of the nest-chamber from the outside. Then one of the pair climbed up toward the higher hole in which the smaller woodpecker had slept. The latter at first drew back into her cavity to make herself less conspicuous, but as the big bird came steadily nearer she slipped out and fled to another dead tree standing a short distance down the slope. Not satisfied with this retreat, the Lineated Woodpecker pursued and chased the smaller bird from branch to branch. The little woodpecker nimbly dodged the big one, and in her brief moments of respite voiced her nervous little *churr*. To my great annoyance, the Lineated Woodpecker inconsiderately continued to chase the oddly painted stranger which seemed so small beside it, and of whose varied colors I had not yet seen enough to write a good description. It would not let her rest until it had driven her quite out of the clearing into the neighboring forest, where she began to make her breakfast upon the fruit of a small tree with glossy foliage. But as I approached she fled away before I would have given her leave to go, and was lost to me in the depths of the forest.

Again, two mornings later, the Lineated Woodpeckers drove the Golden-naped Woodpecker from her hole as soon as they had completed their early morning inspection of their own. After the male Lineated Woodpecker, during the last nights of December, began to sleep in the new hole, the Golden-nape no longer occupied hers so close above it. Doubtless the bigger woodpecker, that objected so strongly to her presence, would not permit her to enter at nightfall. Perhaps the Lineated Woodpeckers were unnecessarily fussy; but in extenuation of their exclusiveness it may be said that Frantzius's Araçaris (*Pteroglossus frantzii*), Band-tailed Tityras (*Tityra semifasciata*), Gray-breasted Martins (*Progne chalybea*) and other birds were looking with covetous eyes upon their laboriously carved hole, and they needed to exercise constant vigilance lest it be stolen from them before they reared their brood in it—as it was taken as soon as that brood departed.

After this episode, busy with the botanical exploration of the region, I saw little of the Golden-naped Woodpeckers during the next two months. But during the last week of February, 1936, I found two pairs carving out nest-cavities. One of these was in the top of a tall, pole-like, barkless dead trunk, hard by the forest, at the head of the same clearing where the lone female had slept. Probably this was the female that had now found a mate and was helping him to prepare the nest-chamber. She still took an interest, during the day, in the old hole which had been her dormitory, and in the Lineated Woodpeckers' hole beneath it. The fledglings of the latter had recently flown away,

and several Frantzius's Araçaris now slept in their cavity. Early on the morning of February 27, I saw the female Golden-naped Woodpecker enter the Lineated Woodpeckers' hole twice, and her old dormitory once, while her mate waited close by.

At the end of February I discovered that this pair of Golden-naped Woodpeckers slept together in an old, weathered hole at the top of the same trunk where they were carving a new one. This had earlier escaped my attention because it faced the wall-like edge of the forest close by, and was not visible from the parts of the clearing where I usually watched. Eighteen minutes after that early songster, the Orange-billed Nightingale-Thrush (*Catharus aurantiirostris*), began its morning chorus, the male woodpecker looked out of his high doorway. Two minutes later, at 6:05, he emerged and climbed up to the truncate top of the tall stub. Then his mate stuck her head through the doorway, and after another three minutes came out and followed him to the top of the stub. Then they flew off to the forest, but after a little while returned to carve at their new hole, now of such depth that they were half-way in and half-way out as they worked.

Male and female shared the task of preparing the nest-cavity, both taking substantial turns at chiselling away at the wood, and each throwing out the chips that it loosened. Their periods of work were rarely much in excess of half an hour. Once in the late afternoon the female remained for nearly an hour in the hole she was carving, but during the last quarter-hour she rested with her head in the doorway far more than she worked. After chiselling for a while, the woodpecker would throw out the loosened wood, many billfuls in succession. At first the birds would reach in from in front to collect the debris from the bottom of the cavity; but when the hole became so deep that only an inch or so of the tail projected through the doorway as they gathered up the loose particles, they changed their mode of procedure and went entirely inside, merely sticking the head out to drop the billful. This hard wood was removed in fine particles, which looked like powdered gold as it drifted downward from the high hole with the morning sunshine upon it. In dropping the chippings directly from the doorway instead of carrying them off in their mouths to a distance, woodpeckers are less careful than some other hole-carvers such as barbets and chickadees; but when thrown from a height as great as the Golden-napes select for their nests, the particles spread out so widely that they hardly form telltale accumulations on the ground below. While one woodpecker toiled, the other would go off into the forest or to a distant part of the clearing. After the worker tired of the occupation it called with a *churr*, rather like the *krrr* of the Wagler's Red-

crowned Woodpecker (*Centurus rubricapillus wagleri*) that nested in the same clearing, but fuller and deeper in tone. Then the mate would come and take over the task. By March 9, the new hole was nearing completion; and now male and female slept in it together, leaving the old one deserted.

INCUBATION

By March 25, one or the other of the Golden-naped Woodpeckers was to be found inside the cavity throughout the day, more often in the bottom than looking through the doorway, leaving little room for doubt that the eggs were laid and were being incubated. At night both male and female still slept in the cavity together. I devoted six hours on the morning of March 27, and four on the afternoon of March 29, to studying the rhythm of incubation at this nest. At daybreak on March 27 the male woodpecker was the first to look through the doorway, but the female pushed past him seven minutes later and climbed to the top of the stub. Here she remained clinging for another seven minutes, when the male flew out and away, whereupon she at once returned to the hole to cover the eggs. After 19 minutes she left, but three minutes later, at 6:11, she re-entered, followed by the male. But he at once came out again to make way for her to emerge and fly away, apparently to seek her first meal of the morning. The male then went back to take charge of the eggs. The female stayed out of sight for one hour and five minutes.

During my ten hours of watching, the male woodpecker took 12 sessions in the nest, ranging from 4 to 38 minutes in length and averaging 19.3 minutes. The female took ten sessions varying from 4 to 44 minutes in length and averaging 25.5. In all, the male was in the nest total of 232 minutes, the female 255 minutes; the two divided the day fairly evenly between them. The nest was neglected for 11 periods lasting from 2 to 16 minutes, averaging 4.8 minutes and totalling 53 minutes. Thus the eggs were attended for 90.2 per cent of the time, not counting those portions of my vigil which fell before the male's emergence in the morning or after the pair retired for the night.

On March 29 I spent the first four hours of the morning watching another high, inaccessible nest of the Golden-naped Woodpecker in which incubation was in progress. Here also both male and female slept in the hole with the eggs. The male was the first to leave in the morning, and after an absence of fifteen minutes, doubtless devoted to foraging, returned to relieve the female which meanwhile, without any breakfast, had been keeping the eggs warm. Thus the two alternated, unlike the first pair keeping the nest constantly attended during my

vigil. During the four hours the male was in the nest for five periods ranging from 11 to 51 minutes in length and averaging 31.4 minutes. The female took five shorter sessions, ranging from 15 to 24 minutes and averaging 19 minutes. The male incubated a total of 157 minutes, the female only 95. The trunk that contained this nest was found prostrate a few days later, before further studies could be made at it.

At both nests it seemed to be the custom for the male to go for breakfast first in the morning, while his mate took care of the eggs. Although either member of the pair might come out of the hole first, if the male emerged first he would fly off out of sight and be gone for about fifteen or twenty minutes; but when the female came out first she would wait close by the nest, and re-enter as soon as her mate flew away. The female's habit of taking the first morning session on the eggs led me to suspect that the male actually covered them during the night, while she perhaps slept clinging to the wall of the chamber above him. Unfortunately it was not possible to peep into the high hole during the hours of darkness and see how the pair arranged themselves in slumber; but observations which are given in detail below show that with both this species and the related Pucheran's Woodpecker (*Tripsurus pucherani*), when from any cause only one member of the pair sleeps in the nest while it contains eggs, this is the male—which strengthens my belief that even when both sexes sleep in the nest, it is he that actually covers the eggs by night. With the great majority of woodpeckers for which we have information (including one or more species of *Centurus*, *Dendrocopos*, *Picus*, *Piculus*, *Phloeoceastes*, *Ceophloeus*, *Campephilus*, *Colaptes*, etc.) the male alone occupies the nest by night while it contains eggs or young. But with the Olivaceous Piculet (*Picumnus olivaceus*) and Lafresnaye's Piculet (*P. lafresnayei*) both parents sleep in the nest, as with the Golden-naped Woodpeckers.

Alternation of the sexes in incubation during the day is the rule among woodpeckers; but of all the species I have studied, including the tiny piculets, the Golden-napes took the shortest turns and replaced each other most frequently. With those woodpeckers which sleep singly, it is customary for the member of the pair coming to take its turn on the eggs to cling near the doorway and wait for the other to leave before entering itself; indeed, with these more solitary woodpeckers one almost never sees two adults together in the nest-cavity at any time, even as they replace each other on the eggs. Very rarely I have seen the new arrival become impatient when its mate was slow to leave, and enter before the other's departure; but each time the impatient one popped out again with such haste that I was led to suspect that this breach of good breeding had elicited an admonitory

peck from the bill of the partner within. But the Golden-naped Woodpecker, during the days while incubation is going on, frequently enters to cover the eggs without giving the mate that has been on duty time to come out. Sometimes the new arrival will deliberately climb out again in order to make way for the departure of the other, but perhaps more often they pass inside the nest. At the second nest, the member of the pair that had been incubating did not always leave as soon as its relief had entered, and the two might remain inside together, during the day, for as much as seven minutes. With the exception of the piculets, I have never seen other woodpeckers do this. Sometimes the Golden-nape that had been keeping the eggs warm did not care to relinquish them when its mate came to take over, and after a few minutes inside, the more recent arrival would leave again.

Despite the, for woodpeckers, unusually frequent exchanges of duty, the Golden-napes were rather irregular in their comings and goings from the nest, and one would at times become bored with sitting and fly out without waiting to be replaced. Or it might merely stick its head through the doorway and call its mate with a loud, resonant *churr*. Since the mate when not incubating passed much time in sight of the nest, it frequently went in the moment it saw the other depart, or at worst after a few minutes' delay. Or if the woodpecker that had suddenly left did not soon find its mate, it would itself return after a brief interval. And so, despite the impatience and irregularity in incubation of these birds, their eggs were never left unattended for many minutes together. The longest period of neglect at Nest 1, lasting 16 minutes, occurred shortly before the pair retired for the night, while the two foraged together over the trunk that held the nest.

A closer companionship existed between the male and female Golden-naped Woodpeckers than between the mated sexes of most other species of woodpeckers that I have watched, with the exception of the piculets. This was manifested not only in their sleeping together throughout the year, but in a dozen little ways during the day. One that we have already mentioned was their remaining together in the nest for brief periods—a slight but most significant point of behavior. The member of the pair not engaged in covering the eggs passed a large proportion of its free time pecking on the nest-tree itself, searching for the insects which lurked in the wood. This probably distracted the mate in the nest, and caused it to look out, and perhaps to leave the eggs sooner than it would have done if left quite alone. At times, when the woodpecker that had been incubating left the nest to join the mate in the vicinity, the two would, after a few minutes, fly together into the nest-cavity. Then one would stay to keep the eggs warm, while the other soon departed.

Because of the lack of an accessible nest, I have not been able to learn the length of the incubation period of the Golden-naped Woodpecker. Probably it is about the same as that of the Trujillo Golden-fronted Woodpecker (*Centurus aurifrons pauper*), which is about 13 days.

THE NESTLINGS

By April 7 the Golden-naped Woodpeckers appeared to be feeding nestlings. They now came and went from the nest far more frequently than formerly; and although at first I could detect no food in their bills as they approached, apparently they brought their newly hatched offspring very small particles that were carried entirely within the bill or mouth. After a few days I could sometimes distinguish part of an insect projecting from the black bill of a parent as it came to the nest, but usually it flew up so rapidly that it was impossible to see what it brought. The Golden-napes fed their nestlings with food carried in the bill, as did the Red-crowned Woodpeckers which nested not far away, not with regurgitated nourishment, as did their other neighbors, the Lineated Woodpeckers, and many other members of the family. Woodpeckers which regurgitate food to their young bring meals at fairly long intervals, but those which carry solid particles in the bill may feed the nestlings quite frequently. On April 22, when the nestlings were a little over two weeks old, the two parents together brought them food ten times during the first half-hour of activity in the morning. Three or four minutes was long enough for these busy woodpeckers to fly off, find food, and return with it to the nest. They now came with well-laden bills, making it easy to see that they brought something. At other nests I have seen the Golden-naped Woodpeckers give the nestlings billfuls of bright red fruit.

So long as the young remained in the nest, and even after they took wing, the parent woodpeckers were careful of the cleanliness of their chamber. Unlike the majority of passerine birds, they did not remove the excreta as they were voided by the nestlings, but rather gave the nest periodic cleanings, removing the accumulated waste matter. Early one morning, after bringing food several times without removing droppings, the female turned her attention to house-cleaning. Upon leaving the nest after taking in a portion of food, she carried out a billful of droppings. Flying with her load to a dead tree standing down the slope, she clung to an upper branch and gave her head vigorous shakes sideways to throw away the refuse. Then she returned immediately to the nest and carried out another billful, of which she disposed in the same fashion. In rapid succession she made eight

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visits to the nest for the special purpose of cleaning it out. At other times the waste material was merely dropped from the doorway. Woodpeckers which do not make a family dormitory of the nest-cavity are less careful of its cleanliness. So long as they must enter to feed the nestlings, the Red-crowned Woodpecker, Golden-fronted Woodpecker and Golden-olive Woodpecker (*Piculus rubiginosus*)—all solitary sleepers—carry out the droppings; but later, when the nestlings take food through the doorway and the parents no longer need to go inside, they neglect to clean the nest. The bottom then becomes foul and maggots swarm in the refuse. The same lack of attention to the sanitation of the chamber after the nestlings take food through the doorway has been observed in certain hole-nesting passerine birds, as, for example, the Allied Woodhewer (*Lepidocolaptes affinis*). But Golden-naped Woodpeckers and Olivaceous Piculets, like the Prong-billed Barbets (*Dicrorhynchus frantzii*) whose nest-cavity also serves as the family dormitory, never relax their efforts to keep their nests in a sanitary condition.

Throughout the nestling period the parent Golden-napes continued to sleep in the nest-cavity. Usually the female came out in the morning a few minutes earlier than her mate; more rarely they emerged together.

The nestlings were no less than 25 days old before they could climb up the foot-high wooden wall of their nursery and look through their lofty doorway. At first they were satisfied with momentary peeps at the outer world, but each succeeding day they spent longer periods with their pretty heads framed in the round aperture. It was always the scarlet-crowned head of a male that I saw in the doorway, but whether always the same individual I could not at first make certain. I watched in vain for a female nestling to take possession of this position which assured priority when food arrived. When one of the parents flew up with a billful, the nestling that had been looking forth would draw back into the interior and vanish, and the adult then passed in the food while clinging to the outside of the trunk below the entrance. Then, after delivering what it had brought, it might enter, and soon come out with waste matter in its bill.

At ten o'clock on the morning of May 10, I first saw one of the young woodpeckers in the open. It was a scarlet-crowned male and he clung to the side of the trunk near the doorway while another scarlet-crown was looking through the aperture. After a while the fledgling that had come out grew tired of clinging in the open and climbed back into the nest. When I visited the nest the following morning, for the first time in several days I saw no young bird's head framed in the doorway.

I waited in vain for one to appear, and at length concluded that the nest must be empty. Since the parents had begun to take food into the nest on April 7, if not a day or two earlier, the young woodpeckers' period of helplessness in the hole was not less than 33 or 34 days. This may be compared with the Trujillo Golden-fronted Woodpecker's period of 30 days as determined at a nest into which I could look, or that of at least 31 days of the Wagler's Red-crowned Woodpeckers whose inaccessible nest was close by that of the Golden-napes.

I found the Golden-nape family high up among the trees at the edge of the forest. The fledglings' call was a weaker version of the *krrr* of the adults. They could already fly for good distances, but not so swiftly and confidently as their parents. Now that the young were all in the open where I could see them simultaneously, I learned that there were three, and all scarlet-crowned males, as I had begun to suspect from seeing only scarlet heads in the doorway before they left the nest. The youngsters rather closely resembled their father, but I could distinguish them by the fact that the scarlet of the crown extended forward nearer the base of the bill and there was a narrower zone of yellow on their foreheads. Later I saw young females which had just come out of other nests; they had black bands across their foreheads like the adults of their sex, but could be distinguished by the less prominent yellow on the forehead. Golden-nape families run to maleness. Of six broods recently emerged from the nest, two consisted of three males only; one of two males only; two of two males and one female; in only one brood of two were the sexes equally represented. In all, there were thirteen males and only three females—an amazing disparity in the numbers of the sexes, equalled in my experience only by the Black-eared Bush-tit (*Psaltriparus m. melanotis*).

FAMILY LIFE AFTER THE NESTING-SEASON

The young woodpeckers' first ventures into the outer world did not take them far from their doorway. Sometimes one would cling for a while to the outside of the trunk close by it, then grow tired and pass inward. Thus they became somewhat familiar with its position, and accustomed to entering, before they went off on longer excursions. Even after they had begun to fly among the neighboring trees, they returned early to their nursery. During their first days afield, they would sometimes go back soon after three o'clock in the afternoon, even if no rain fell, as it so often did those May afternoons. But there was no fixed hour for their retiring, for one would at times remain out long after his brothers had gone to rest. If there were no shower, their homecoming seemed to depend upon how soon they grew tired of climbing over the trees.

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Even on the afternoon of the first day when I saw them at a distance from the home trunk, one of the young Golden-napes of my first family found his way home without guidance. But at other nests, the fledglings are led by the parents on their return after their first long outing. The parents may cling on opposite sides of the doorway, or one may rest beside it while the other enters; and this is all the urging the young woodpeckers need to go in. Their instinct to follow their elders is strong; and one that lingers out late, or leaves the hole after it has been led to rest, is often brought home by an exemplary visit to the interior by a parent, who then comes out, leaving the youngsters within. Or if a youngster in the open sees those in the hole receive food, it may hurry in to better its chances of getting a meal. Certainly young Golden-naped Woodpeckers regain their high doorway with far less instruction than is required by young wrens, which forsake their nursery at a far earlier age.

Late in the afternoon of his second day among the surrounding trees, one of the young Golden-napes, that had long since retired, was frightened from the hole by a visit from a pair of Frantzius's Araçaris. He flew to a neighboring trunk, while his excited parents darted back and forth above the nest. After the intruders had departed and the turmoil died away, the father woodpecker entered the hole, where the other young birds had remained through all the hubbub, and turning around to look out, uttered a peculiar churring call, quite distinct from anything that I had ever before heard from him or his mate. This brought the young fugitive home in a trice. But ten days later, when the parents entered the hole at four o'clock in the afternoon and called for their fledglings to come to rest, the young birds, which I heard churring within the neighboring forest, quite ignored the summons, as disobedient children not infrequently disregard their parent's command to go to bed. The parent woodpeckers were ever watchful and attentive to their younglings. Sometimes one of these, going alone to the doorway, would hesitate to enter, pushing his head in only to withdraw it again, repeating this over and over, afraid to go in alone, or else displaying a degree of caution surprising in one so young. If a parent were near by, it would hurry to the hole and enter, whereupon the young woodpecker would promptly follow.

After their early return to the nest, the fledgling woodpeckers were fed inside, exactly as though they were helpless nestlings which had never been flying about among the trees. After delivering food through the doorway, the parent needed to be quick in getting out of the way of the bill that received it; for the young bird would often peck or bite at its elder—an ill-mannered way of asking for more, at least

by human standards. Once the father was not sufficiently alert, and the fledgling he had just fed plucked a downy feather from his breast. It stuck to the young bird's bill, and cost him considerable shaking of his head and rubbing of his bill against the sides of the doorway before he could rid himself of the light encumbrance. If the fledglings were very hungry, they would peep loudly in a high-pitched voice whenever food was brought to them. This feeding of the fledglings after their return to the nest is not the rule in all Golden-nape families. Some young birds go later to rest from the first, and receive no more supper after retiring. All seem to be slow in outgrowing their infantile habits with the result that their parents must continue to clean out the hole for a number of days after their first departure.

When the light began to grow dim, the parents would join the fledgling woodpeckers in the hole for the night, the father usually first. Often their entry was greeted by a chorus of high-pitched fledgling cries. Sometimes the parents of older nestlings, or of fledglings, remain outside, clinging to the trunk near the doorway, until an hour unusually late for woodpeckers, as though wishing to escape the youngsters' importunings for yet more food. I have even known a female Golden-nape, the mother of three young fledglings, to go to rest in a separate hole in the same trunk, apparently in the interest of a more tranquil night.

In the morning, the parents would leave the hole first, but the young woodpeckers soon followed—there was not so great a difference in their time of emerging as in their time of retiring. A week after their first flights, the young birds delayed in the nest for five minutes after their parents' morning departure. Then a loud call from one of their elders brought two promptly out to receive their breakfast; but the third fledgling required a second summons. I have known other parent Golden-napes, whose fledglings had made only a single excursion into the neighboring forest, to bring a few morsels of breakfast to them while they delayed nearly an hour in the hole, trying to gather courage to brave once more the perils of gravitation at so giddy a height.

But the capacious cavity which the Golden-naped Woodpeckers had carved during the dry season was more than a nest and a dormitory; it was also the home in which these beautiful birds took shelter from the rain. If the rain were light, the recently emerged fledglings alone remained within, while their parents flew about in the drizzle and brought them food. Yet a heavy downpour might send the whole family into the hole. If it stopped early, the parents and even the fledglings might come out for a while before retiring for the night; but if it continued hard and without interruption, all would stay within

from about four o'clock until the next morning, the fledglings going hungry to sleep. Rains before noon were rare in this region; but once I saw the male woodpecker lead one of his sons into the hole to escape a light shower that began at seven o'clock in the morning. Then the father flew across to the edge of the forest to join the rest of the family. But the young woodpecker did not enjoy being left alone in the nest, and preferring a wetting in company to dryness in solitude, soon came forth to seek the others.

One of the young Golden-naped Woodpeckers of my first family vanished before he had been a fortnight out of the nest. The other two resided with their parents in the family home for many months more. After three weeks, there was little difference in the time of retiring in the evening and departing in the morning of the old birds and the young; and after a month had passed, a young bird would sometimes leave before an adult in the morning. By August the young males could not be distinguished from their father in appearance. Until October, all four surviving members of this family continued to sleep in the hole in which the younger two had hatched in April. Now followed a period of inconstancy in their arrangements for sleeping. Some would pass the night in the old hole (A) which had been abandoned by the parents upon the completion of the new one (B) in March, and was now in a somewhat ruinous state, with a gap in the outer wall near the bottom. The family did not always divide up in the same manner; for on certain nights they would sleep two and two together, while on others the division would be three and one; then again they would all stay together. Likewise, they experienced difficulty in deciding just where each would sleep, for often a woodpecker would enter one of the holes only to come out and climb over the trunk to the other. This restlessness continued until the end of the month; nor could I ascertain its cause. It appeared not to be that all the members of the family did not agree together as of yore, for I never noticed any sign of disharmony. Possible lice or other vermin had infested one of the holes and made the woodpeckers restless.

Before the end of October, one of the males—I believe a young one—had vanished, never to be definitely recognized again. From early November onward, the mated pair with the remaining son continued to sleep regularly in the newer hole (B), as formerly. During the last quarter of the year, they were most irregular in their time of departure in the morning, lingering in their dormitory for half an hour to more than an hour after the early birds had become active; while an interval of half an hour would sometimes separate the exits of two members of the family on the same morning. They did not wake up, or at least

did not show themselves in their doorway, until the early risers of the feathered community had been flying about for a good while; then while waiting to come out one would gaze through the aperture, or they might take turns in occupying this position. On cool mornings, I have seen Golden-naped Woodpeckers return, after a tentative excursion to the outer side of their trunk, to enjoy the shelter of their hole for a few minutes longer. They appeared not to awake in the morning with a ravenous appetite, and often were in no hurry to break their fast. Even after delaying in the hole for a long time after earlier birds had been up and about, upon emerging they might cling to their own or a neighboring trunk, preening, stretching their wings and yawning, for a good while before they flew off to hunt food. So, too, in the afternoon they often satisfied their hunger long before it grew dark, and waited idly either near their hole or in it until they were ready to sleep.

The members of the family had no fixed order for entering their dormitory in the evening or for departing in the morning. Sometimes the adult male entered or left first, sometimes the female; and after the young males had acquired fully adult plumage and could no longer be distinguished from their father, the mother might enter or depart between two males. Yet I have records of seventeen times that a male entered first for the night, to five times by the female; and of sixteen times that the female departed first in the morning, to nine times by a male. Thus even if the order of entering and leaving was not constant, there was a strong tendency for the female to retire later, and to become active earlier in the morning, than the males. With the pair of Red-crowned Woodpeckers that slept in the same clearing, the two always in separate holes that had usually been carved by the more industrious male in trees with very soft wood, the male almost invariably went to rest earlier than his mate, and stayed longer in his dormitory next morning. Among birds, there appears to be a general tendency for the sex which incubates through the night to take the longer period of rest. Among passerine birds, it is apparently always the female which takes charge of the eggs and young by night; and in some species she goes to roost sooner, and becomes active later in the morning, than the male.

Toward the end of June, the father of our Golden-nape family had begun a new hole (C), about two feet below that in which he and his mate had nested, and where the pair still slept with their two surviving sons. From time to time I saw him working at this in a desultory fashion, in the evening before he went to rest. At times he would continue at his task for half an hour, as the light faded, yet he accomplished little. For many months, I never happened to find him en-

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gaged in chiselling out the hole at other times of day; and he can not have worked very hard, for by the beginning of October, after more than three months of intermittent activity, the cavity was still too shallow for him to enter. By mid-October, it had grown large enough to contain a woodpecker; for one evening I saw the female inside, with her head in the doorway. But apparently she had not much room to spare. Despite her interest in this new cavity, she did not actually work upon it—at least, not in my presence—until four months after this. Once I found the young male taking a few pecks at the excavation, but he accomplished scarcely anything. At the end of October, I for the first time found the adult male chiselling at the new hole in the forenoon. Still, the work continued to progress so slowly that by the middle of February, when the female at last began to perform her share of the labor, the birds still pecked away from the outside. But now that another nesting-season was approaching, they intensified their effort, working at all hours of the day; and the new cavity was rapidly enlarged.

At the end of February, 1937, there began another unsettled period in the lives of these Golden-naped Woodpeckers. Birds of many kinds were nesting or at least hunting sites for their nests, among them the Costa Rican Band-tailed Tityras (*Tityra semifasciata costaricensis*), whose favorite nesting-place in this region is a hole carved by Golden-naped Woodpeckers. Often a brownish female tityra entered the hole in which my woodpeckers slept, while her white, black-trimmed mate rested atop the tall stub, twitching his black-banded tail and voicing bizarre, grunty notes. Nor did she neglect to investigate the Golden-napes' new hole; but this was still too small for her purpose. Although the woodpeckers were often present at the time of her visits, they usually watched her with indifference, never making a serious effort to drive her away. Each of these peace-loving birds held the other in wholesome respect. Soon the female tityra, followed back and forth by her attentive mate, began to carry fine, dead twigs, flower-stalks and dry leaves into the hole (B) where the Golden-napes slept. Sometimes, upon retiring in the evening, the woodpeckers would patiently throw these out the door. Yet this interference broke up their routine. On the last night of February, they did not sleep in their home tree at all, but in a very old hole in the top of a tall, slender trunk tottering on the verge of collapse, just within the neighboring edge of the forest. But after a few days, they returned to the dormitory they had used so long. On the evening of March 11, the female Golden-nape retired, for what I believe was the first time, to sleep alone in the expanding new hole (C), leaving the father and son alone in the old one (B). But

apparently she felt cramped for space there, for she returned the next evening to sleep with the others in the usual dormitory.

That evening, March 12, was the last time, or the last but one, that the young male slept within the parental walls. He was now a few days more than eleven months old, and it was time for him to face the world alone, many months later than young woodpeckers of most other kinds take this important step. During his last few weeks with his parents, I thought that I detected traces of antagonism between his father and himself; but I never saw any actual quarreling. His departure marked the beginning of a new chapter in the lives of the parents. They were once again the mated pair, unaccompanied by young, that I had met a year earlier, ready to undertake the rearing of another brood. What would their fortunes be this year?

THE SECOND NESTING-SEASON

After the departure of the young male, the father slept alone in the old hole (B), the mother again in the still unfinished one (C) two feet lower. But the tityras had meanwhile strengthened their claims upon the old chamber for their nest; and the woodpeckers, deciding to abandon all the upper part of their trunk (including another hole, D, that they had recently started about a yard below (C), began still another hole (E) in the lower portion, only twenty feet from the ground—one of the lowest holes of the Golden-naped Woodpecker that I have ever seen. Although the cavity begun in June was still unfinished after nearly nine months, under the necessity of completing a receptacle for their eggs, which were due to appear in a short while, the pair worked so hard that almost before I was aware of their intentions they had made the new, low chamber big enough for the male to pass the night in it. His mate continued to take shelter apart from him, in the unfinished high hole, only a night or two more, until the low one could accommodate her beside the male. With other pairs, too, I have known the male and female to sleep in separate holes, when they appeared to experience difficulty in finishing a new cavity and apparently possessed no single chamber capacious enough to hold the two together.

Now, on March 19, the pair were definitely established in the hole (E) where they would nest. But they had made an unwise choice of location. In trying to escape the tityras, which although troublesome were harmless, they had moved to within a yard of an old hole of the Guatemalan White-billed Woodpecker, in which a pair of Frantzius's Araçaris occasionally slept and where they were preparing to nest. One evening at the end of March, the excited cries of the woodpeckers drew my glance their way, just in time to witness one of these small

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toucans fly from their doorway with a pure white egg grasped in the end of its great red bill. The aperture was too narrow for the araçari to pass through; but apparently the hastily completed chamber was not as deep as it should have been, and the long-billed bird could reach the egg while clinging in front.

Although, like other toucans, Frantzius's Araçaris are beyond doubt arrant nest-robbers, they appear seldom to despoil nests placed very close to their own, in this resembling some of the hawks. At least, I have often known tityras and woodpeckers to bring up their broods in safety within sight of the araçaris' nest, sometimes in the same trunk. Possibly the araçari that stole this egg was not one of the pair which nested so close by, but rather another individual which sometimes wandered into the clearing, to the great annoyance of the resident pair. So far as I could learn, no more eggs were taken from the Golden-napes' nest by the araçaris.

Despite the loss of one of their eggs, the woodpeckers succeeded in hatching the others, and had begun to carry food into the nest by April 9. (In the previous year, when their preparations for nesting had not been disturbed by other birds, and when the weather during the first three months had been much drier, their nestlings hatched out about April 7—a difference too slight to be significant.) But the following morning I found that their nest had been torn open by some strong-clawed predatory animal, which had been small enough to remove the two eggs from the neighboring nest of the araçaris without enlarging their wider doorway. This disaster had evidently befallen them during the afternoon, for all the parents, woodpeckers and toucans alike, escaped with their lives; and at dawn next morning the male Golden-nape came forth from his hole with a gaping entrance, where he had passed the night alone. Soon he returned with food in his bill, took it into the desolated nest, and came out still holding it. Twice he returned to the nest with the morsel in his bill, as though unable to convince himself of the irrevocable reality of his loss. I have known birds of other species, including a male Yellow-green Vireo (*Vireo virescens flavoviridis*), a male Jalapa Collared Trogon (*Trogon collaris puella*), and a pair of Golden-masked Tanagers (*Tangara nigro-cincta*) to bring food to a nest where the young had recently died or been removed by a predator; and similar instances have been recorded by other observers for other species.

While at their low hole, the Golden-napes showed great confidence in me. One morning the male continued alternately to chisel and to throw out chips while I stood almost directly below his doorway. If I tapped on the trunk while one of the pair was incubating, it came to

the doorway to look down at me, but did not deem it necessary to leave, and calmly watched me move about with my head scarcely five yards below its own. When I climbed the ladder to look into the lower nest of the araçaris, the woodpeckers merely slipped out of their own and climbed a little higher up the trunk; and hardly had I reached the ground again before they returned to their eggs. Unfortunately my ladder was not long enough to bring me within reach of their own nest, and none could be constructed with the materials available which was light enough to manage. Of their close neighbors, the araçaris, the woodpeckers were a trifle shy. If the bigger birds approached their hole while the woodpeckers were clinging in front of their own, or looking through the entrance, the latter would climb higher up the trunk, or else fly to a neighboring tree. As soon as the araçari had gone into its nest, the Golden-napes returned to theirs. In the evening, the araçaris entered their hole for the night later than the woodpeckers. Although the great-billed birds alighted at their doorway with a loud thud, the noise and vibration of the wood appeared not to disturb the woodpeckers a yard away.

No matter what mishaps befell them, the male and female of this pair of Golden-naped Woodpeckers slept together whenever they had a hole big enough to accommodate the two. After the spoliation of their lowest hole (E), they returned to the unfinished cavity (C) begun the previous June, worked hard during the day to enlarge it, and took shelter in it by night. Here they were again neighbors of the tityra, which continued to incubate her eggs in the high, safe hole she had taken from them, all undisturbed by their hammering as they put the finishing touches upon the chamber so close below hers. This hole may truly be said to have become old before it was new, for its completion occupied nearly ten months. By April 20, the woodpeckers appeared to be incubating in it; but by the middle of May they were again enlarging the cavity, having somehow lost eggs or young nestlings from it. Still they continued to sleep here, and by the end of the month were incubating a third time, the second time in this hole. When I took leave of these Golden-napes in mid-June, they were at last feeding nestlings in it. I had followed the varying fortunes of the pair for so long a period that I felt a personal interest in them, and fervently hoped that they would be successful in rearing this latest brood, and have a young family to dwell with them through the coming year.

I believe that but for the interference of other birds and mammals, this pair of Golden-napes would have made only a single hole during the course of a year. It seems to be usual for these woodpeckers to

carve their new hole as the breeding-season approaches, not upon its termination in the manner of the Blue-throated Green Motmots (*Aspatha gularis*). This difference in procedure is correlated with the great care the woodpeckers excercise to keep their nest clean; were they as neglectful of this matter as the motmots, the cavity in which the nestlings were reared would not be a fit dwelling during the ensuing ten months. In laying their eggs in a new hole, and keeping it faultlessly clean, the Golden-naped Woodpeckers agree with the Costa Rican Prong-billed Barbets. But the barbets, as far as I could learn during a year's residence among them, carved new holes only during the breeding-season; if these were lost before the approach of the succeeding season of reproduction, they slept in any cavity of suitable size that they could find without an occupant.

OBSERVATIONS ON OTHER FAMILIES

Other Golden-nape families I have watched have not been fortunate enough to retain possession of the same dwelling during the cycle of the year. The tall, dead trees in which their holes are carved often fall; but perhaps even more of the woodpecker homes are lost to the Band-tailed Tityras or the Inquisitive Tityras (*Tityra inquisitor*). These cotingas do not sleep in cavities; but while the Golden-naped Woodpeckers rear only a single brood, they raise two in a season—at least the Band-tailed Tityra sometimes does, and the Inquisitive Tityra often builds a late nest in anticipation of doing so. Thus they attempt to gain possession of the Golden-napes' holes both before the latter have begun to incubate and after their brood is awing. Their method is very simple; they never fight the woodpeckers, but quietly fill up their hole with dead leaves and twiglets.

The Golden-naped Woodpeckers, even when they see what the tityras are about, rarely try to drive them away, never become really angry; I sometimes doubt whether these mild-mannered birds are capable of genuine anger. Their method of counter-attack is as quiet and gentle as the others' mode of attack; in the evening, when they go to rest, they drop through the doorway the materials that the intruders have laboriously carried in during the day. But the day is long and the evening short, with the result that the builders gain upon the unbuilders—'destroyers' would be too strong a term in this instance—and finally the woodpeckers find their quarters cramped and decide it will be easier to make a new home than to trouble themselves with so much housecleaning in the evening when they are weary. The new hole is, whenever possible, placed in the same trunk as the old one.

Toward the middle of June, 1939, an Inquisitive Tityra began to carry leaves into a hole from which three Golden-naped Woodpecker fledglings had departed only two weeks earlier. Although the woodpecker family of five continued to sleep in this cavity in their customary manner, I did not see them make the slightest move to defend it; they climbed over the neighboring branches of the dead tree and watched with seeming indifference while the female tityra, followed like a shadow by her faithful but inefficient mate, took leaf after leaf into their dormitory. Their only reply to the invader was the prompt beginning of a new cavity in a neighboring branch of the same tree. So the robber and the robbed were building, each after its own fashion, in the same tree at the same time, each party ignoring the other. The woodpeckers seemed to be racing to complete their new chamber before the Inquisitive Tityra made the old one too small for them. They continued to toil on rainy evenings, after the light had grown almost too dim to distinguish their colors. What a contrast between this long-continued labor by both sexes, and the leisurely way in which my first pair of Golden-napes had gone about the carving of the hole that the male begain in June! One of the young males, that had left the nest less than three weeks earlier, took a few pecks at the new hole but accomplished little.

But the tityra, working alone, gained on the woodpeckers, toiling in shifts. It was so much easier to fill up a space with loose leaves and twigs than to carve an equal space out of solid wood. On the rainy evening of June 15, a young Golden-nape entered the hole in which he had been hatched, and threw out a twig and a leaflet carried in by the tityra. But then he was joined by his brother and sister, and no more of the litter was removed. The father went directly to an old hole below that on which he had been working—most probably an earlier residence of his own, now the object of an endless controversy between two pairs of Band-tailed Tityras, each of which desired it and kept the other from building (Skutch, 1946: 346–348). Then the mother woodpecker tried to enter with her offspring, but finding the remaining space too contracted for her accommodation, went to join her mate in the old hole. Although the Inquisitive Tityra was present when the young woodpeckers entered the hole she had claimed and threw out the two pieces of her material, she made no more protest than the woodpeckers had made when she carried them in.

Three days later, the Golden-napes' new hole had grown sufficiently capacious to receive two of the young birds in the evening. The third tried to join them, but push as hard as it would, its tail and the tips of its wings remained sticking through the doorway. The two

within must have been already tightly packed. Finally the third admitted the fact of its incompressibility and came out to seek another lodging. At this point, the woodpecker family was thrown into confusion by the arrival of four Frantzius's Araçaris, that slept in an old hole of one of the larger woodpeckers in the same dead tree. The two fledglings in the new cavity unpacked themselves, and all five darted back and forth among the naked branches. After the araçaris had entered their lodging, two woodpeckers returned to the new hole, and a third, again failing in its efforts to compress itself into the remaining space without leaving its tail exposed to the night winds, joined the other two in the old cavity two feet below. Although some of the woodpeckers had gone earlier in the evening to the doorway of their former dwelling, they did not enter. The tityra had won the race; her triumph was complete. But hers was a sterile victory, for she did not nest in the hole she had taken from the woodpeckers. Apparently her kind often prepare for a second brood, but in El General I have never known them to rear one.

As for the woodpeckers, they enjoyed a good deal of wholesome headwork, and had a new dwelling. A week later it had grown large enough to contain four of them, and promised soon to provide space for the fifth.

All Golden-naped Woodpeckers are not as forbearing as this pair. In April, 1940, I watched a female Inquisitive Tityra fill up a very high hole at the edge of the forest, in which a pair of Golden-naped Woodpeckers still slept while they carved a new cavity lower in the same trunk. They seemed to be in a hurry to finish and worked alternately throughout the morning, each continuing at its task until relieved by its mate. On the evening of April 10, I found the female woodpecker looking out from the new hole, which had been enlarged rapidly during the past week. Soon she came out and climbed up to the old dormitory at the top of the trunk. She entered and in rapid succession threw out 36 leaves and pieces of leaf, which fluttered slowly downward a hundred feet to the ground. Then she ejected several mouthfuls of wood dust from the bottom of the cavity—evidence that poor tityra's nest-building was quite undone. After cleaning out the old house, Mrs. Woodpecker descended to her new apartment to sleep with her mate. Such uncharitable zeal to keep the tityras out of the hole they no longer need is in my experience rare among Golden-naped Woodpeckers. Yet nowise discouraged by the loss of all her gathered materials, the tityra continued to fill up this hole, and as far as I saw was not again disturbed by the woodpeckers, now comfortably established in the lower cavity. The tityra began to incubate, but was ap-

parently unsuccessful in hatching her eggs. The woodpeckers, more fortunate, brought out a family of three male fledglings, which in the evening were led back to the nest and slept there in company with their parents.

Another pair of Golden-naped Woodpeckers reared two male fledglings and one female, in a hole about twenty-five feet up in a dead trunk standing amidst a field of maize. These left the nest in May, 1942. Two months later I found the family sleeping in a hole they had newly carved lower in the same trunk, its doorway only twelve feet eight inches above the ground—the lowest Golden-nape's hole I have ever seen. The young female had already vanished and only the two sons remained with the parents. By early September, the four were sleeping in still another hole, freshly carved a yard above the last. I could discover no cause for these frequent changes in domicile; but possibly vermin had caused the birds to move to new chambers. In carving these holes which they did not use for breeding, the woodpeckers resembled some of the wrens, whose numerous nests that never hold eggs are often called 'dummies,' although with a number of species they appear to be built for the same purpose as the woodpeckers' cavities.

Toward the end of the year, this family of Golden-napes began mysteriously to dwindle away. By early December, it was reduced to two males and a female; by January, 1943, to a male and a female, which usually slept in separate holes in the same trunk. From this, I inferred that the survivors were mother and son; had the two been a mated pair, they most probably would have slept together. One evening the female, frightened from the lowest hole by my approach, tried to enter the male's higher chamber, but was refused admittance. After lingering five minutes before the forbidden doorway, she climbed backward down to her own—the watcher meanwhile having made himself less conspicuous. But a week later, the two slept together in the male's hole; he was present first, and allowed his supposed mother to enter without protest. By early February she had vanished; and for well over a month the male Golden-nape was the sole occupant of the trunk with many chambers; in addition to those we have had occasion to mention, there were a number of older ones. By the last of March he, too, had disappeared. Only a lone araçari arrived in the dusk, and after calling many times without response, winged swiftly away from the deserted tree.

A family of Golden-napes which I watched in 1943 also shifted their quarters frequently. From their breeding-nest high in a many-branched, charred, dead tree standing amidst a newly made pasture,

two male fledglings took wing on May 25. That evening their parents led them to sleep in the hole where they grew up, and for several weeks this continued to be their nightly shelter. On June 12, the father was discovered carving a new hole at the very top of the same trunk; it was already deep enough to contain him. In the middle of the following afternoon I found his mate taking shelter from the rain in this new hole; but soon she became bored with inactivity and flew out into the downpour. That evening one member of the family entered the new hole to sleep. On the night of June 15, the female slept alone in the new hole, the father and his two sons in the old cavity that had been used for nesting. On June 19 the female and one male slept in the new hole, the other two males in the old one. On June 24, when they were thrown into confusion in the evening by a belligerent Band-tailed Tityra nesting in the same tree, all four woodpeckers went to rest in the old hole. By June 25, these woodpeckers were making a second new hole in the same tree, both male and female sharing the task of carving it out. On subsequent nights the family often divided up between the old hole and the completed new one, but not always in the same fashion; for sometimes the female would sleep with one male in the old hole, sometimes in the new one, while the other two males occupied the other hole. But after early July, all four slept together in the old hole again. In September the tree fell and I lost track of the family. I can not explain why some Golden-nape families should shift their quarters so often whereas others, as the first that I watched, were content with their breeding chamber as a dormitory for many months after the close of the nesting-season. When I studied the Banded Cactus Wren (*Heleodytes zonatus*) I found the same puzzling discrepancies, some families occupying the same dormitory for long periods, others changing their lodging at relatively short intervals (Skutch, 1935: 271–272).

An Abnormal Pair

As told in an earlier paragraph, the family of five Golden-naped Woodpeckers—three males and two females—which at the end of October, 1944, began to visit my feeding-shelf, slept in a hole high up in a massive dead tree just within the edge of the forest on the ridge behind the house. Here all five passed the nights together until the middle of March, 1945, when a male and a female, doubtless the parents of the other three, moved to a new hole which they were completing lower in the same trunk. The other three continued to sleep in the old one until the end of the month when one vanished, and a few days later the other two followed. During the last weeks, when the family

all slept together in the same trunk, I sometimes saw one woodpecker chase another in the evening before they retired; but the mild pursuit was always transitory and never, so far as I saw, led to a real conflict. Sometimes after the chase was over, the two woodpeckers that had taken part in it would rest amicably side by side. After the mated pair took possession of the new hole, they would retire relatively early in the evening and linger late in the morning; but those that continued to sleep in the old hole would go in unusually late, sometimes when it was nearly dark, and fly away in the morning long before the others were up. Possibly the final abandonment of the old hole was hastened by the Band-tailed Tityras which now claimed it for nesting.

During the second week of April, the mated pair began to incubate in the new hole, at first turn and turn about, and to sleep together in the nest-cavity by night, in proper Golden-nape fashion. But before the eggs hatched a most curious, and in my whole experience with woodpeckers entirely unprecedented, domestic situation arose. The male woodpecker alone took charge of the nest and eggs during the night, while the female slept by herself in one or another of the old, dilapidated holes high above him in the top of the dead tree. This, of course, is normal behavior in other species of woodpeckers; but what follows was altogether unique. By day, whenever the female approached the nest-hole, the male sallied forth to chase her away! He was trying to carry on incubation all alone, but would have warmed the eggs more constantly if he had not so often left the nest to drive away his erstwhile helpmate. She apparently still desired to incubate, and once did actually enter the hole for a few minutes during the male's absence, remaining until he returned; but in the face of repeated rebuffs she abandoned the attempt. I could not ascertain the cause of the male woodpecker's pique, but wondered whether it was somehow related to the fact that the female's tail was for some unexplained reason slightly shorter than normal.

After a few days there appeared to have been a partial reconciliation between the two. The male now permitted the female to peck over the dead trunk near the nest; but although she sometimes looked in through the doorway, she no longer tried to incubate. The male successfully hatched at least one of the eggs, for by April 20 he was carrying food into the nest. The quarrel had now been so far composed that the female again entered the hole for brief periods by day; but she still slept in the old hole at the top of the tree and paid little attention to the nestlings, leaving to the male almost the whole burden of their care. I awaited their emergence from the nest to learn how many he would be successful in rearing; but before they were many days old some mishap befell them and the parents no longer entered the hole.

The pair now, at the end of April, began a new hole in a neighboring dead trunk, working alternately in the usual manner. After it was big enough the male slept in it, but the female still roosted in the very old hole at the top of the original trunk. But this newest hole apparently never contained an egg, for about May 3 the pair returned to the hole from which they lost the nestlings. They slept together in it, and by day both occupied it for brief periods, the male more than the female. But after incubation of the new set of eggs was well under way, the male again kept them warm during the day with little or no help from his mate. Unhappily, at this point the nest was apparently again raided, for the woodpeckers quite abandoned this tree and I could not discover where they went.

As an alternative explanation to a lack of harmony between the male Golden-nape and his original mate, we might consider the possibility that he lost his first mate and that another female tried to attach herself to him, much against his will. But in view of the low proportion of females in the Golden-nape population, I think it unlikely that a new female should have arrived so promptly, or tried so hard to reach an understanding with an unappreciative male. And when we recall that during the second nesting, too, incubation did not proceed in the normal fashion but the male covered the eggs with little or no help, we see that even assuming the loss of the first female, we are still faced with our original difficulty of explaining the lack of harmony in a mated pair.

While the male of this abnormal pair was incubating alone, I spent a total of about six hours watching the nest, timing 18 of the male's sessions, which ranged from about 1 to 30 minutes and averaged 10.4 minutes; and 17 of his absences, which varied from 1 to 32 minutes and averaged 8.5 minutes. He kept the eggs covered only 55 per cent of the time. During some of my watches he devoted a considerable amount of his energy to driving the female from the vicinity of the nest; but even after he ceased active hostility and tolerated her presence, his assiduity in incubation did not increase. As compared with male Golden-naped Woodpeckers incubating normally in alternation with their mates, the sessions of this peculiar male were on the average only about one-third to one-half as long, but his absences were also very much shorter. He spent a greater proportion of the day in the nest than the male at Nest 1, but not so much as the male at Nest 2.

NOTES ON RELATED SPECIES

The kind of family life and manner of sleeping exemplified by the Golden-naped Woodpecker might be briefly designated the '*Tripsurus-*

type.' Complete studies of other members of the genus are lacking, but the facts available for two other species suggest that they order their lives in essentially the same way. Pucheran's Woodpecker (*Tripsurus pucherani*) ranges through the Caribbean rain-forests from southern México to Colombia, thence down the Pacific coast of South America to southern Ecuador. In appearance, it differs from the Golden-nape chiefly in its red rather than yellow occiput and nape, and the widely spaced white bars on its black back and wings.

Despite a number of seasons passed in the range of these woodpeckers, I discovered the home of only a single pair. When I first made their acquaintance, in the middle of April, 1941, they were completing a new hole in a dead trunk standing in a maize field, on a steep slope above the Pejivalle River in Costa Rica. The male and female already used the new cavity as a dormitory; the male entered first in the evening and lingered within longer in the morning. Before they began to incubate, a Band-tailed Tityra started to fill up the bottom of their chamber with dry litter for her nest, causing the patient woodpeckers to carve another hole lower in the same trunk. But before completing this they started still a third, a yard higher, male and female sharing the task of chiselling out the hard wood. As soon as it was sufficiently capacious, the male slept in the newest cavity, the female in the next-to-newest, three feet below him. I do not know why they did not lodge together as formerly, unless because the hardness of the wood prevented the completion of a chamber big enough to accommodate both with comfort. When at length they began to incubate, it was in the hole in which the *male* slept. His mate continued to roost in her separate cavity. This arrangement was still followed after the nestlings hatched; unfortunately I left the region before they were fledged. These observations suggested the answer to a question which had long been in my mind with reference to the Golden-naped Woodpeckers: Which member of the pair actually warms the eggs during the night? Later, as told above, I gathered further evidence on this point at the abnormal nest of the Golden-napes themselves, and now have little doubt that in the normal course of events the male actually covers the eggs through the night; the female probably sleeps clinging to the wall above him.

While the pair of Pucheran's Woodpeckers still occupied their first and highest hole, I saw the male eat an egg which apparently he had removed from his own nest. On May 19, the female stayed many minutes in the newly carved low hole, probably laying an egg. After she left the male went in, then emerged with an egg in his bill and dropped it to the ground. The egg, as seen through binoculars, ap-

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peared small in proportion to the woodpecker that laid it, and upon examining the smashed remains lying on the ground, I could detect no trace of a yolk. How could the woodpecker discover this in the still unbroken egg? Was the egg rejected merely because of its unusual smallness? I once saw a male Streaked-chested Acorn Woodpecker (*Balanosphyra formicivora striatipectus*) remove an egg from a recently abandoned nest-cavity (inaccessible to me) where incubation had been going on, and deposit it on the end of a neighboring stub. Was this egg left behind when the other eggs of the set, or possibly recently hatched nestlings, were removed by a nest-robber? Early one morning a female Olivaceous Piculet carried an egg from a hole used by four individuals for sleeping. Moreau (1942: 39) records that a White-rumped Swift (*Micropus caffer streubelii*) threw an egg from the nest after seven days of incubation; it was presumably of normal size but contained no embryo. He remarks that this observation suggests that the incubating swift is aware of the condition of its eggs, and the same apparently applies to woodpeckers.

In the eastern foothills of the Andes of Ecuador and Perú, and on the western side of the immense Amazonian plain, one of the most abundant members of the family is the handsome Crimson-bellied Black Woodpecker (*Tripsurus cruentatus*), clad largely in black, with a large patch of deep crimson on its lower breast and belly. I found it far noisier than its Central American congeners and almost as vociferous as the Acorn Woodpecker, which it somewhat resembled in language. One evening while I dwelt at Puyo in eastern Ecuador, five of these active woodpeckers gave me a magnificent exhibition of aërial flycatching, in their strong flight and intricate maneuvers rivalling the Neotropic Kingbirds (*Tyrannus melancholicus*) which were engaged in the same occupation at the same time. They continued this activity until the sunset glow had quite faded from the snowy, smoke-plumed summit of Sangay far away to the south. Then when it was nearly dark they retired, all five together, into a hole high up in a dead palm trunk, standing pole-like in a hillside pasture. This I supposed to be a family consisting of parents and three children, sleeping in exactly the same fashion as their northern cousins, the Golden-naped Woodpeckers. A year later, I watched four of these Crimson-bellied Black Woodpeckers retire to sleep in a hole only ten feet above the ground, in a low stub in a pasture, at Caballo-Cocha near the Amazon in Perú. Like the birds at Puyo, they did not enter until it was nearly dark. I watched the woodpeckers at Puyo in August, those at Caballo-Cocha in October; and the presence of family groups during these months leads me to suspect that the birds had nested earlier in the year.

But at Satipo, considerably farther to the south in the Andean foothills of Perú (in the Department of Junín), early in September, a male and female Crimson-bellied Black Woodpecker slept in the same hole, in a lofty branch of a tree growing near the Agricultural School. They seemed to be preparing to breed, for they were engaged in carving a new hole in a neighboring branch. Meanwhile, a female Inquisitive Tityra was carrying leaves into the old hole where they slept. She looked on quietly and made no disturbance while one of the woodpeckers threw some of her material from their dormitory, but not nearly so much as she had taken in that morning. From Central America to Perú and Brazil, woodpeckers of the genus *Tripsurus* must contend with the Band-tailed and Inquisitive Tityras which use their holes for nesting, and fill them up with leaves, to the great annoyance of the owners. And over all this vast territory, the competition goes on, apparently, with silent persistence and never a fight, never even the vengeful tearing out of a feather by the chief protagonists. How mild of manner are these tropical birds!

COMPARISON WITH OTHER WOODPECKERS

Briefly to compare the social and nesting behavior of the Golden-naped Woodpecker with that of other picarian species for which we have the necessary information, we may make use of a 'key' such as taxonomists employ for the ready comparison of morphological characters. The following preliminary and partial classification of woodpeckers according to their life history is a modification of that first published some years ago (Skutch, 1943: 359). Where references to literature are not given, the species are included on the strength of unpublished observations of the writer.

I. A single pair attend the nest.

A. *Centurus*-type: Individuals past the nestling stage regularly sleep one in a hole; the male attends the nest by night, his mate roosting elsewhere; food is delivered to the nestlings either as solid particles carried in the bill or by regurgitation; the nest is at first kept clean, but as the nestlings grow older waste is often allowed to accumulate in it; the fledglings are not led back to sleep in the nest after their first flights. Examples:

Wagler's Red-crowned Woodpecker, *Centurus rubricapillus wagleri*. (Skutch, 1943: 359–361.)

Hoffmann's Woodpecker, *Centurus hoffmannii*. (Information on return of fledglings lacking.)

Trujillo Golden-fronted Woodpecker, *Centurus aurifrons pauper*. (Information on return of fledglings lacking.)

Costa Rican Golden-olive Woodpecker, *Piculus rubiginosus uropygialis*.

Panamá Lineated Woodpecker, *Ceophloeus lineatus mesorhynchus*.

Ivory-billed Woodpecker, *Campephilus principalis*. (Tanner, 1941.)

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Guatemalan White-billed Woodpecker, *Phloeoceastes g. guatemalensis.* (Information on return of fledglings lacking.)
Boquete Hairy Woodpecker, *Dendrocopos villosus extimus.*
British Lesser Spotted Woodpecker, *Dendrocopos minor comminutus.* (Information on return of fledglings not available. (Witherby, *et al.* 1938: 288–291.)
Northern Flicker, *Colaptes auratus luteus.* (Information on return of fledglings not available. (Bent, 1939; Skutch, 1937.)

B. *Tripsurus*-type: Adults occupy their sleeping-cavities by pairs or family groups, rarely alone; male and female sleep in the nest with the eggs and young; food is brought in the parents' bills; the nest is kept clean until the young take wing or later; fledglings return to sleep in the nest-cavity with their parents, and may continue this habit until the approach of the following breeding-season. Examples:
Golden-naped Woodpecker, *Tripsurus chrysauchen.*
Veragua Olivaceous Piculet, *Picumnus olivaceus flavotinctus.*
Apparentley also:
Pucheran's Woodpecker, *Tripsurus p. pucherani.*
Crimson-bellied Black Woodpecker, *Tripsurus cruentatus.*
Lafresnaye's Piculet, *Picumnus lafresnayei.*

II. More than two grown birds attend the nest.

C. *Balanosphyra*-type: Four or five individuals may take turns at incubation and join in attending the nestlings; one sleeps in the nest, the others in a neighboring hole. (Information on this type of life history is still incomplete.) Example.
Streaked-chested Acorn Woodpecker, *Balanosphyra formicivora striatipectus.* (Skutch, 1943: 363.)

Some authors (*e.g.*, Griscom, 1932: 226) would reduce *Tripsurus* to a subgenus of *Centurus.* In view of the fundamental differences in life history which we have pointed out, it seems best to retain these two groups as distinct genera, unless further studies show that the differences in behavior are not associated in a constant manner with the morphological differences on the basis of which they were originally separated.

SUMMARY

1. The Golden-naped Woodpecker (*Tripsurus chrysauchen*) is endemic in an isolated region of lowland rain-forest on the Pacific side of Costa Rica and extreme western Panamá. It is found at all seasons in pairs or family groups of not over five individuals, rarely alone.

2. These woodpeckers nest and sleep in holes usually carved high up in fire-killed trees standing near the forest's edge in newly made clearings, or in dead trees just within the edge of the forest. When these holes are immediately needed either as a dormitory or as a receptacle for eggs, male and female share rather equally the task of carving them out; at other times the male may work at them alone in a leisurely fashion, spending many months on a single cavity.

3. In the basin of El General, Costa Rica, the breeding-season extends from late March to June. A single brood is reared each year; but if the first attempt to produce offspring is unsuccessful, the pair may try at least twice more.

4. Male and female occupy the nest-cavity by night, whether it contains eggs or young. By day the two alternate in incubation, replacing each other more frequently than most other woodpeckers. Unlike woodpeckers which sleep in solitude, male and female are often together in the nest-cavity by day.

5. The young are nourished with solid food brought in the parents' bills—not by regurgitation. They remain in the nest about 33 days. Throughout this period the parents carefully clean the nest.

6. Three is the maximum number of young known to be fledged in any nest. In six broods recently emerged from the nest, there were 13 males and only three females.

7. After the young begin to fly about, they return in the late afternoon to sleep with both parents in the hole where they were reared. From the first they regain their high doorway with little or no instruction, but at times a special call of the parents is used to bring them home. After their return, they are, in some families at least, fed by the parents as though they were nestlings; and the adults continue to remove waste matter from the nest. Recently emerged fledglings take shelter from afternoon showers in the nest-cavity; and if it rains harder the parents join them inside.

8. The young may continue to sleep with their parents until a short while before the following breeding-season—until they are nearly a year old. Sometimes the family continues during all this period to occupy the hole in which the young were reared, with perhaps occasional periods of restlessness when they shift temporarily to neighboring holes. But other families carve new holes after a month or so and move into them. The cause of these differences in behavior is not always clear, but possibly the presence of vermin leads the woodpeckers to abandon their holes either temporarily or permanently.

9. There is no fixed order for entering the hole in the evening or leaving in the morning, but the female tends to be the last to retire and the first to emerge. Compared with other birds, Golden-napes go to rest early and become active late.

10. Golden-naped Woodpeckers lose many holes to the two species of *Tityra* that dwell in the same region. Both the Band-tailed and Inquisitive Tityras fill the woodpeckers' cavities with dead leaves and sticks in anticipation of laying their eggs. The original owners throw some or all of this trash out, but the tityras then take more in. Final-

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ly, tiring of removing foreign material, the woodpeckers carve new holes close by. No fighting between woodpeckers and tityras has ever been witnessed.

11. An eccentric male Golden-nape persisted in driving the female from the nest. He incubated alone and slept alone in the hole with the eggs. Even after a partial reconciliation between the members of the pair, he did most of the work of attending the nestlings.

12. Incomplete studies of Pucheran's Woodpecker (*Tripsurus pucherani*) and the Crimson-bellied Black Woodpecker (*T. cruentatus*) furnish evidence that they have the same type of life history as the Golden-naped Woodpecker.

13. A classification of the woodpeckers according to the pattern of their life history is attempted.

14. *Tripsurus* is distinguished from *Centurus* by fundamental differences in life history as well as by morphological characters.

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NOTES ON THE BIRDS OF THE STATES OF PERNAMBUCO AND PARAIBA, BRAZIL

BY DONALD W. LAMM

IN their 'Birds of Lower Amazonia,' Griscom and Greenway (Bull. Mus. Comp. Zoöl., 88, 1941) refer to this region as a "neglected corner of Brazil," a statement borne out by the number of new forms and extensions of range in the small collection made by the author.[1] It is for this reason that the writer ventures to submit the following field notes and observations on birds encountered in the area.

The city of Recife, where the writer was located, is in the state of Pernambuco, on the coast, about eight degrees below the equator, and almost at the apex of the 'bulge' of northeastern Brazil. The rainy season in this region commences about March and lasts until the end of August. The climate is moderate throughout the year, but somewhat cooler during the rainy season. Mean temperature is 82 degrees Fahrenheit. The lowest recorded temperature is 52 degrees and the highest 103 degrees, but the normal variation is between 70 and 95 degrees.

This region offers a number of varied habitats within close proximity to one another. Of these, the ocean and beach are the least profitable for the bird observer. Pelagic species are rarely seen, and their appearances are almost exclusively confined to the months of April and May when occasional birds are blown in by storms. Frigate Birds, Brown Boobies and Brazilian Cormorants have been noted, as well as a petrel tentatively identified as the Trinidad Petrel (not included in the following list). Shore birds are fairly common on the beach in season.

Immediately behind the beach is a fringe of coconut palms, stretching inland for about half a mile. Most of this region is inhabited, and there is some cultivation, principally of mandioca. Certain tanagers, flycatchers, the bananaquit, hummingbirds, parrakeets and the house wren are most common in this section.

Several small rivers empty into the ocean in the vicinity of Recife, usually bordered by fairly extensive mangrove swamps. There are also a number of small fresh-water marshes. The latter particularly support an abundance of aquatic species, including rails, herons, kingfishers, ducks, gallinules, a grebe and numerous migrant shorebirds.

Further inland there is a large area of semi-open country, some of which is planted with mandioca and other crops. Seedeaters, fly-

[1] Two new forms described by Dr. J. T. Zimmer in the Proceedings of the Biological Society of Washington, 60: 99–106, 1947.

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catchers, anis, guiras, tanagers and doves are the most conspicuous birds of this section. Isolated wooded patches are scattered about this semi-open country, usually on the tops of small hills. They support an entirely different type of bird life, including numerous small jungle flycatchers, honey-creepers, antbirds, manakins, tinamous and woodhewers. A number of trips have been made to a jungle area near the town of Goiana, about forty miles north of Recife. Such species as cotingas and araçaris were found primarily in this area.

The interior of the states of Pernambuco and Paraiba is usually arid, and is known as the Sertão. The terrain is frequently rocky and the flora consists largely of cactus and low brush with some dense high thickets and occasional light woods. This region supports a number of species not found on the coast, such as the *tico-tico* and the *seriema*. The most prevalent Sertão birds include Brazilian Cardinals, several species of doves, mockingbirds, orioles and the omnipresent vultures and caracaras.

Over a period of more than four years, the writer has spent approximately 450 hours in the field. At various times he has been accompanied by Lieutenant E. Pfeiffer (U. S. Marine Corps), Lieutenant Donald Alexander (U. S. Army), Captain Frank Connor (U. S. Army), Lieutenant George Cummings (Brazilian Air Force) and Mark Taylor (Rubber Development Corporation), whose able assistance has made this paper possible. Much welcome aid and encouragement has also been supplied by Dr. Herbert Friedmann, Curator of Birds at the U. S. National Museum, who has struggled with poorly worded descriptions and badly damaged specimens.

The following list is by no means complete for the region, as only those species observed and definitely identified by the writer are included. Data for the coastal region are fairly representative, although some species, such as *Trogon variegatus*, which are known to occur in this part of Brazil, have not been seen. Material on the interior is necessarily very incomplete, since it is based principally on occasional trips. The rhea, for example, is not uncommon in central Pernambuco, but I have never encountered it. Certain material has also been deleted from the paper because of lack of corroborative specimens.

TINAMIDAE. Tinamous.

Crypturellus soui albigularis (Brabourne and Chubb).—Fairly common in heavy jungle at Goiana. Also at São Caetano in high brush country about 100 miles inland.

Crypturellus parvirostris (Wagler).—One was shot in rolling grasslands at São Lorenzo, about fifteen miles west of Recife. The species was later found to be fairly common in this section.

Rhynchotus rufescens rufescens (Temminck).—Occasionally seen in open fields around Recife. Not uncommon in the grasslands at São Lorenzo, where it is usually hunted with dogs.

Nothura maculosa cearensis Naumburg.—One was collected near Campina Grande, Paraiba, at an elevation of about 2,000 feet. Half-grown birds were found near São Lorenzo on August 4, 1945.

COLYMBIDAE. Grebes.

Podilymbus podiceps antarcticus (Lesson).—Fairly common on fresh-water lakes throughout both states.

SULIDAE. Boobies

Sula leucogaster leucogaster (Boddaert).—Uncommon. Two were seen off the reef at Recife in March, 1943. Any other appearances of this conspicuous species could hardly have been overlooked.

PHALACROCORACIDAE. Cormorants

Phalacrocorax olivaceus olivaceus (Humboldt).—Not common. Several were seen about a mile offshore in March, 1943.

FREGATIDAE. Frigate Birds

Fregata magnificens rothschildi Mathews.—Frigate Birds, presumably of this species, were seen in April, 1943, and several times in May, 1944, always moving southward.

ARDEIDAE. Herons

Ardea cocoi Linnaeus.—Apparently rather uncommon near Recife. One was seen at a distance deep in a brackish marsh on October 15, 1944; another at close range in a mangrove swamp, December, 1945.

Butorides striatus striatus (Linnaeus).—Very common in both mangrove and fresh-water swamps. One was seen carrying nesting material on April 23, 1944. It was also observed at Patos, Paraiba, at a small lake about 160 miles inland, and at other interior lakes and ponds.

Florida caerulea (Linnaeus).—Fairly common in both fresh-water and mangrove swamps. One was seen at Patos, Paraiba.

Casmerodius albus egretta (Gmelin).—Common, principally in the mangrove swamps. A small flock was found at Patos, Paraiba.

Nycticorax nycticorax hoactli (Gmelin).—A roost of five birds was found on the wooded shore of a large pond 200 miles inland, near Pombal, Paraiba.

Ixobrychus exilis erythromelas (Vieillot).—Only seen twice, on both occasions in a fresh-water marsh close to Recife.

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Botaurus pinnatus (Wagler).—Fairly common, and noted regularly in one large brackish swamp. Some of these occurrences, however, doubtless represent repeats.

ANATIDAE. Ducks

Dendrocygna viduata (Linnaeus).—Large flocks are to be seen in the brackish marshes from the middle of September to April. These flocks break up and the birds become more widespread during the rainy season. A nest containing eleven eggs in a fairly advanced stage of incubation was found at the edge of the swamp on September 17, 1944. These ducks were fairly common at Patos, Paraiba, on August 13, 1944.

Dendrocygna autumnalis discolor Sclater and Salvin.—Uncommon near the coast, but about 4,000 were seen at the lake at Candado in western Paraiba, October, 1945.

Sarkidiornis carunculata (Lichtenstein).—About 40 or 50 were seen among some thousands of tree ducks on a large artificial lake (Candado) in western Paraiba near Pombal.

Anas brasiliensis (Gmelin).—Common in both fresh and brackish marshes, usually in small flocks and normally not closely associated with other species.

Nomonyx dominicus (Linnaeus).—This species was found to be fairly common in a fresh-water swamp, heavily overgrown with weeds, at Campo Grande, about 40 miles west of Recife, in June, 1944.

CATHARTIDAE. American Vultures

Coragyps atratus foetens (Lichtenstein).—The Black Vulture is abundant and very tame. It is the principal scavenger in the city of Recife and throughout the coastal area, but is somewhat less common in the interior.

Cathartes aura ruficollis Spix.—Very common throughout the region, but somewhat less so than the Black Vulture, which, however, it outnumbers in the interior.

ACCIPITRIDAE. Hawks, Kites, etc.

Elanus leucurus leucurus (Vieillot).—Seen on four or five occasions, usually over semi-open country.

Harpagus bidentatus bidentatus (Latham).—One was shot in dense jungle at Goiana in October, 1945. Apparently not common.

Heterospizias meridionalis meridionalis (Latham).—Noted on several occasions in the interior in rolling country which was well watered.

Buteo magnirostris nattereri (Sclater and Salvin).—Common and widely distributed throughout the coastal area, but principally in the palm fringe near the ocean. Also fairly common in the Sertão. A nest was found in a *caju* tree about 15 feet above the ground. It contained one egg on January 1, 1947.

Asturina nitida nitida (Latham).—One of these hawks was observed on a number of occasions, always in the same high tree in thick jungle south of Recife.

Hypomorphnus urubitinga urubitinga (Gmelin).—Fairly common. Frequently seen soaring with the vultures, usually in the vicinity of water. It was reported by a reliable source to attack chickens. Also seen at Patos, Paraiba, in August, 1944.

FALCONIDAE. Falcons

Herpetotheres cachinnans queribundus Bangs and Penard.—One was seen in a sparsely wooded zone near Aguas Belas, in south-central Pernambuco, January, 1945.

Polyborus plancus brasiliensis (Gmelin).—A widely distributed species, common in the palm fringe and somewhat less so in the interior.

Gampsonyx swainsonii swainsonii Vigors.—A small sluggish hawk. Apparently not common. It was seen on two occasions sitting on telegraph poles near the air field at Recife.

Falco sparverius eidos Peters.—Fairly common throughout the interior and noted even in the most arid sections. Also occasional in grasslands near the coast.

RALLIDAE. Rails

Rallus longirostris crassirostris Lawrence.—Five of these large rails were found in a small section of grassy marsh on January 16, 1944. In view of their readiness to take wing instead of skulking when approached, it is considered possible that the birds might be migrants. They were noted again in the same marsh on January 21, 1945.

Porzana albicollis albicollis (Vieillot).—Easily the commonest species of rail in the region. A female taken in August, 1943, had in the ovary two eggs complete except for shells. One was noted with a downy chick on March 25, 1945.

Porzana flaviventer flaviventer (Boddaert).—Seen occasionally in fresh-water marshes.

Laterallus melanophaius melanophaius (Vieillot).—Found on three occasions, twice in a small fresh-water marsh and the other time along a stream bank. A female with ovaries fairly well developed was taken on December 5, 1943.

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Gallinula chloropus galeata (Lichtenstein).—Fairly common in fresh and brackish swamps about Recife, but noted more often in the interior. One small chick was found on October 13, 1943. Downy chicks a day or two old were noted at Patos, Paraiba, on August 13, 1944.

Porphyrula martinica (Linnaeus).—Fairly common at Campo Grande on June 25, 1944. A number were seen in fresh-water marshes near Recife on August 20, 1944. This species has not been observed near Recife during the dry season.

CARIAMIDAE. Seriemas

Cariama cristata (Linnaeus).—This species is confined to the arid interior, where it is not uncommon or particularly wary. Seen frequently along the road in western Pernambuco.

JACANIDAE. Jaçanas

Jacana spinosa jacana (Linnaeus).—Very common in all swamp and marshy sections in the Recife area. Full-grown immature birds were noted on March 26, 1944. Fairly common at Patos, Paraiba.

CHARADRIIDAE. Plovers

Belonopterus chilensis cayennensis (Gmelin).—Fairly common near Recife in both fresh and salt-water swamps, but only noted during the dry season. Also common in the Sertão, where every pond, however small, seems to have at least one pair.

Squatarola squatarola (Linnaeus).—Two birds in winter plumage were found on a sand spit on May 21, 1944. These birds are fairly common winter residents. The earliest fall record is September 9, 1945.

Charadrius hiaticula semipalmatus Bonaparte.—Flocks of 50 to 100 migrant shorebirds, including this and the preceding species, as well as Sanderlings, are often to be seen on the beaches in March and April. Exact fall dates are not available for this species, which appears to be somewhat less common than *C. wilsonia*.

Charadrius collaris Vieillot.—This resident species is fairly common throughout the year, being found in the same areas as those frequented by the migrants and also further inland. A specimen taken on June 29, 1945, was approaching breeding condition. One was taken in August, 1944, at Patos, Paraiba, about 160 miles inland.

Charadrius wilsonia wilsonia Ord.—Noted in mixed flocks from September 23, 1945, throughout the winter. The latest spring date was supplied by a specimen collected on May 21, 1944. Compared

with North American specimens this bird is nearest to typical ***wilsonia***, but has the white frontal band narrower but not so narrow as in ***beldingi***. Further material should be of interest.

SCOLOPACIDAE. Sandpipers

Numenius phaeopus hudsonicus Latham.—A fairly common species in the tide-water mangrove swamps throughout the winter, but it is very shy. The earliest fall date is September 23, 1945.

Tringa flavipes (Gmelin).—Fairly common. Noted from November 14 through April 15 in brackish and fresh-water marshes.

Tringa melanoleuca (Gmelin).—Three were shot out of a flock in a mangrove swamp close to the ocean on January 2, 1944. Lesser Yellow-legs and dowitchers were also present in the immediate vicinity.

Tringa solitaria cinnamomea (Brewster).—Common from early November to the middle of April, principally in fresh-water marshes. One collected April 16, 1944, was in breeding plumage. This species was very common along a small stream in the arid interior near São Caetano on February 26, 1946.

Actitis macularia (Linnaeus).—One was shot along the bank of the Paraiba River near João Pessoa on October 11, 1943. Others were noted in January and February.

Arenaria interpres morinella (Linnaeus).—Two small groups of three and four birds, respectively, were noted in a tide-water mangrove swamp on September 23, 1945. A flock of about 20 birds was seen close to the Pernambuco-Alagoas border on October 11, 1946.

Limnodromus griseus griseus (Gmelin).—Three birds were collected on January 2, 1944, out of a flock which also contained Lesser Yellow-legs. They were found in a swampy lake, surrounded by mangroves, close to the ocean.

Capella paraguaiae paraguaiae (Vieillot).—Common throughout the year in both salt and fresh-water swamps. A female in breeding condition was shot June 4, 1945.

Capella undulata gigantea (Temminck).—Uncommon. Only two birds were seen—one collected July 16, 1943, and the other September 15, 1943, both in a small fresh-water marsh close to the Recife airfield. Local hunters confirm that this species is seen very infrequently.

Crocethia alba (Pallas).—Common along the ocean beaches during migration, particularly in April. The latest spring record is May 21, 1944, and the earliest fall appearance, August 25, 1944. Frequently found in flocks with Semipalmated and Wilson's Plovers.

Ereunetes pusillus (Linnaeus).—One was shot and four others were seen along the coast close to the Pernambuco-Alagoas border on Octo-

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ber 11, 1946. An injured bird was found on the beach at Recife, December 18, 1946.

Erolia minutilla (Vieillot).—Common in brackish marshes from late September through the middle of March.

LARIDAE. Gulls and Terns

Sterna hirundo hirundo Linnaeus.—One was collected out of a flock of 64 migrant terns, most of which were referable to this species. The flock appeared on October 8, 1944, and remained for several days fishing off the reef near Recife.

Sterna superciliaris Vieillot.—One was seen hovering over a small lake between Patos and Soledade in central Paraiba on October 18, 1945.

Thalasseus sandvicensis acuflavida (Cabot).—A few terns in the above-mentioned flock were identified by sight as being of this species.

COLUMBIDAE. Pigeons

Zenaida auriculata noronha (Chubb).—Several small flocks were observed at Patos, Paraiba, in the high Sertão on August 13, 1944. Very common on the Pernambuco-Paraiba border about 150 miles inland in October, 1945. Local sources state that enormous flocks of this dove are present in the Sertão during August and September.

Scardafella squammata squammata (Lesson).—Common in the palm fringe, although less so than *passerina*. A nest with two young was found in a palm tree on May 21, 1944. This species is abundant throughout the dry interior.

Columbigallina passerina griseola Spix.—Very common in the palm fringe and abundant in open fields. Also common in parts of the interior. Nests were found, usually on the ground, throughout the dry season, from the middle of September until the end of April. One was discovered on August 4, 1945, during the rainy season, containing two eggs. The nests were constructed of dried grass, and, though rather untidy, were better made than is usual in this genus. All but one were found on the ground. The exception was rather crudely built with dried reeds, and was in a crotch of a fallen branch about a foot above the water in a marsh. In no instance did the number of eggs exceed two. A nest located on November 2, 1943, contained one egg and one young bird, evidently very recently hatched. It was 1¼ inches long and sparsely covered with buff-colored down.

Columbigallina talpacoti talpacoti (Temminck).—This handsome species is fairly common, usually noted in open fields along the coast.

Leptotila verreauxi approximans (Cory).—A male with testes enlarged was collected at Patos, Paraiba, in August, 1944. Not very common at São Caetano in high brush country, February, 1946. This species was also found to be fairly common in a narrow stretch of high brush country near the ocean in the vicinity of Recife.

PSITTACIDAE. Parrots

Aratinga jandaya (Gmelin).—These striking parakeets were fairly common in the palm fringe, usually in small flocks containing a dozen birds or less.

Aratinga cactorum caixana Spix.—Found only in the arid interior, where it is very common from Rio Branco (130 miles inland), Pernambuco, westward. Usually in groups of two to eight birds.

Aratinga aurea aurea (Gmelin).—Common in semi-open country where there are sufficient trees to act as cover. Occasionally occurs in large flocks. Neither this nor *Aratinga jandaya* were noted in the Sertão.

Forpus passerinus vividus (Ridgway).—This small parrotlet is fairly common in the semi-open country and somewhat less so in the palm fringe. It is always in flocks except during the breeding season. It was seen a number of times in the interior.

Amazona aestiva aestiva (Linnaeus).—Observed on four or five occasions in wooded areas in the interior, principally near the São Francisco River in southern Pernambuco.

CUCULIDAE. Cuckoos

Piaya cayana pallescens (Cabanis and Heine).—Fairly common in brushy sections; also observed infrequently in jungle.

Crotophaga ani Linnaeus.—A very common bird throughout the coastal zone. It is found in all types of terrain except jungle, but appears to prefer open fields and semi-marshy sections. Not uncommon in the interior. Half-grown young were noted near Recife on July 16, 1944, still being fed by the parents.

Guira guira (Gmelin).—Only slightly less common than the ani, and frequents the same type of terrain, although it shows more preference for brushy sections. The flocks are very sedentary, sometimes remaining for months in one field.

TYTONIDAE. Barn Owls

Tyto alba tuidara (J. E. Gray).—Two young about 16 days old were found in the belfry of an old church near the Recife airfield on August 26, 1945.

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CAPRIMULGIDAE. Goatsuckers

Chordeiles pusillus pusillus Gould.—A large percentage of the nighthawks observed in this region are apparently of this species. Specimens were collected on several occasions, including one at Patos, Paraiba, in August, 1944.

Podager nacunda nacunda (Vieillot).—Definitely identified several times. One was shot out of a large scattered group in a marshy section in open savannah country about 40 miles west of Recife.

Hydropsalis braziliana brasiliana (Gmelin).—Only identified once, when one bird was shot out of fifteen or twenty present on the airfield on September 11, 1943.

CYPSELIDAE. Swifts

Chaetura andrei meridionalis Hellmayr.—Swifts are not common in this region. The only specimen collected was referable to this species.

TROCHILIDAE. Hummingbirds

Glaucis hirsuta hirsuta (Gmelin).—Fairly common but irregularly distributed in jungles near Recife. Not noted at Goiana.

Phaethornis ruber ruber (Linnaeus).—Found only in jungle where it is very common and exceedingly vocal. Mating display was observed in June, 1944, and 1945. This display consisted solely of the male darting back and forth very rapidly a few inches over the female.

Eupetomena macroura simoni Hellmayr.—Fairly common in the palm fringe and in semi-open country; not uncommon at São Caetano.

Melanotrochilus fuscus (Vieillot).—Rather uncommon. Several were seen at Escada (40 miles south of Recife) drinking from a waterfall in a low jungle section on November 25, 1944. Another was observed in jungle near Recife on January 27, 1945.

Chrysolampis mosquitus (Linnaeus).—This brilliantly colored hummer is rather uncommon. It was noted in brushy sections and occasionally in jungle.

Polytmus guainumbi thaumantias (Linnaeus).—Seen on only four occasions, always in marshy areas.

Amazilia fimbriata nigricauda (Elliot).—Common in the palm fringe, in brushy country, and even in the parks of Recife; occasional in jungle. Also common in the São Caetano region. One was observed feeding young on October 1, 1945.

ALCEDINIDAE. Kingfishers

Ceryle torquata torquata (Linnaeus).—Seen on an average of about eight times a year, usually in the larger swamps—possibly often the

same birds. One was noted fishing on a reef about a half mile from shore in February, 1946.

Chloroceryle amazona amazona (Latham).—Fairly common in the mangrove swamps and somewhat less so in fresh-water marshes and along streams. Also seen in the interior.

Chloroceryle americana americana (Gmelin).—Fairly common in fresh-water marshes, and on lakes and ponds in the interior.

GALBULIDAE. Jacamars

Galbula rufoviridis rufoviridis Cabanis.—Fairly common in jungle and occasional in trees about cultivated areas.

BUCCONIDAE. Puffbirds

Nystalus maculatus maculatus (Gmelin).—Common in trees in semi-open and brushy sections, frequently close to human habitations. Often noted on telegraph wires. It was rather common in parts of the interior.

Chelidoptera tenebrosa brasiliensis (Sclater).—A pair of these puffbirds lived close to a stream on the road to João Pessoa, about 30 miles north of Recife. They were feeding full-grown young on March 19, 1944. Apparently quite rare as none were observed elsewhere.

RAMPHASTIDAE. Toucans

Pteroglossus aracari aracari (Linnaeus).—Found only in heavy jungle in the vicinity of Goiana, about 40 miles north of Recife. Although infrequently seen, their cry, which is much like an axe hitting a tree, but with a slightly more metallic ring, was often heard. Two specimens were collected on December 26, 1943.

Pteroglossus inscriptus inscriptus Swainson.—Only noted on one occasion, when a male was taken on October 1, 1944, in medium second-growth jungle close to Recife.

PICIDAE. Woodpeckers

Chrysoptilus melanochloros juae Cory.—Common, but almost entirely confined to the palm fringe. One was shot in north-central Pernambuco on October 16, 1945.

Veniliornis passerinus taenionotus (Reichenbach).—Fairly common in the jungle and occasional in the interior.

Picumnus exilis pernambucensis Zimmer.—Not common. Seen twice near Recife, once at the edge of the jungle and once in second-growth thickets near the ocean. One specimen was collected.

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DENDROCOLAPTIDAE. Woodhewers

Lepidocolaptes fuscus atlanticus (Cory).—Found exclusively in heavy jungle near the coast where it is not uncommon. A male in breeding condition was shot November 12, 1944, and several other specimens were collected.

Sittasomus griseicapillus reiseri Hellmayr.—Common in the jungle. A male with enlarged testes was collected July 9, 1944. Easily the commonest woodhewer in this region.

FURNARIIDAE. Ovenbirds, Spine-tails, etc.

Furnarius figulus figulus (Lichtenstein).—Common in all marshy sections. Nests were noted in April and May. A nest containing three eggs was examined May 28, 1944. The species was also noted in the interior.

Synallaxis frontalis frontalis Pelzeln.—Not uncommon in heavy jungle. One was taken in brushy country at the edge of the Sertão.

Certhiaxis cinnamomea cearensis (Cory).—One was shot at São Caetano on October 15, 1945.

Pseudoseisura cristata (Spix).—A common and conspicuous species in the Sertão, usually found in pairs. Their bulky nests are a regular feature of the landscape in the interior.

Automolus leucophthalmus lammi Zimmer.—Specimens were collected in thick jungle at Dois Irmaos Park, Recife, on February 18 and August 12, 1945. Not seen on any other occasion.

Xenops minutus (*genibarbis?*) Illiger.—Collected on three or four occasions, always in heavy jungle. Two males shot on November 12, 1944, were in breeding condition. Probably more common than these records indicate as it is very inconspicuous.

FORMICARIIDAE. Ant-thrushes

Taraba major stagurus (Lichtenstein).—Not common along the coast. A female was collected in a brushy section just south of Recife. Several males were noted in high bush country at São Caetano, where it is apparently more common.

Thamnophilus doliatus capistratus Lesson.—Apparently uncommon near the coast. An immature male was shot in dense undergrowth in a jungle section near Recife. Fairly common at São Caetano.

Thamnophilus palliatus palliatus (Lichtenstein).—Apparently not common here. Observed twice at the edge of the jungle near Recife.

Thamnophilus punctatus pelzelni Hellmayr.—A male was taken on July 2, 1944, in low growth at the edge of the jungle south of Recife. Others were noted later in another jungle section near the city.

Myromotherula axillaris luctuosa Pelzeln.—A common species in the jungle where it is normally found in lower growth. Sometimes present in mixed feeding flocks with *Xenops* and other insectivorus birds.

Myrmorchilus strigilatus strigilatus (Wied).—A ground-haunting ant-bird which was almost certainly of this species was fairly common in the dense brush at São Caetano. Several specimens were examined. It was not found along the coast.

Formicivora grisea grisea (Boddaert).—Rather common. Usually encountered in the jungle, but occasional along the coast in thick brush. It was taken also at São Caetano.

Pyriglena leuconota pernambucensis Zimmer.—Common in the thick jungle at Goiana, but only taken once in jungle sections south of Recife. A ground species.

CONOPOPHAGIDAE. Gnat-eaters

Conopophaga lineata (Wied).—Four fully-grown immature birds were found in the jungle near Recife on April 30, 1944. Several others were taken later in dense jungle, but this gnat-eater is not common.

COTINGIDAE. Chatterers

Xipholena atro-purpurea (Wied).—Several specimens were collected in thick jungle at Goiana. This species is confined to large jungle areas. Pinto (*Catalogo das Aves do Brasil*) was of the opinion that this cotinga was extinct in the northeast.

PIPRIDAE. Manakins

Pipra erythrocephala rubrocapilla Temminck.—Fairly common in low dense jungle.

Chiroxiphia pareola pareola (Linnaeus).—Common in low jungle at Goiana and fairly common in similar areas south of Recife. Courtship dancing by this species was observed for about half an hour on January 22, 1945. Four males and one female were present, but two of the males were merely onlookers. The other two used a small horizontal branch about two feet above the ground. They perched parallel to one another, and first one and then the other would jump about a foot in the air, beating his wings violently and uttering a purring note. Frequently they would jump over one another. When the female, which was silent throughout, alighted on a branch close by, they usually deserted their perch and demonstrated on each side of her. When she retreated they returned to the original branch. Finally she alighted on the perch and both faced her and danced violently. This occurred several times until one male finally left (not visibly driven off)

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and the female remained on the branch, posturing and hopping a little, while the male danced excitedly about her. Three or four times he darted to a twig about six feet away but returned immediately. They finally copulated twice in close succession, after which he flew off, but she remained for about a minute longer. All birds then deserted the area, but a male returned shortly thereafter and began calling.

Manacus manacus gutturosus (Desmarest).—Common in all jungle sections. Mating display was observed in early October.

TYRANNIDAE. Tyrant Flycatchers

Fluvicola pica albiventer (Spix).—This flycatcher is unknown on the coast but is common in the interior, where it is found side by side with *climazura* and apparently replaces *leucocephala*. Noted at São Caetano but no nearer to the littoral. At São Caetano it was outnumbered about five to one by *climazura*. Whereas *climazura* runs along the ground seeking its food, *albiventer* is inclined to perch on a twig close to the water and catch flies in the air.

Fluvicola climazura climazura (Vieillot).—This ground flycatcher is the commonest bird about the streets and parks of Recife. It is also very common throughout the coastal zone, and moderately so in the interior. It is particularly partial to localities where there is water, and is confined to such sections in the Sertão. A nest containing almost grown young was found on October 24, 1943. Another nest in process of construction was found in a swamp on April 23, 1944, and a nest with one egg on January 20, 1946. Nests were noted at heights varying from twelve to three and one-half feet above the ground, and were always in the vicinity of water, usually at the end of a limb with the entrance facing outward. They are covered at the top, and are normally constructed of dried grass with some cotton near the entrance, and are lined with feathers.

Arundinicola leucocephala (Linnaeus).—Very common in marshy sections but apparently confined to the coast. A nest containing two eggs was found on November 14, 1943. Numerous nests were under construction during the latter part of April, 1944, and a nest visited May 28, 1944, contained three eggs. The nests are to be found in bushes in the swamps, usually not over four feet above the ground. No attempt is made to conceal them, and they are invariably very conspicuous. The nests are very well made, and are roofed, with the entrance at the side. They measure about four inches high, and about three wide, and are constructed principally of dried grass. The chamber is thickly lined with soft substances, usually some type of down.

Muscivora tyrannus tyrannus (Linnaeus).—Although the Fork-tailed Flycatcher is common farther north, it is rare in Pernambuco and Paraiba. One was seen January 13, 1946, at Goiana and another at Recife, February 23, 1946, both in brushy areas. These birds are believed to be migrants.

Tyrannus melancholicus despotes (Lichtenstein).—Abundant in brushy and semi-open localities where it is frequently noted on telegraph wires. It is present even in the driest parts of the Sertão, but is much less common in the interior.

Empidonomus varius varius (Vieillot).—Occasional in semi-open and brushy country, usually in small flocks.

Megarhynchus pitangua pitangua (Linnaeus).—Seen on several occasions in the jungle at Goiana. It is immediately distinguishable from the preceding species by its note.

Myiozetetes similis pallidiventris Pinto.—Common in semi-open country and marshy sections. A nest discovered on February 27, 1944, had just been completed. Another, containing four eggs, was found on April 23, 1943.

Pitangus sulphuratus maximiliani (Cabanis and Heine).—This large, noisy flycatcher is found most commonly in the palm fringe and somewhat less frequently in semi-open areas, and was observed at Patos, Paraiba, and in other parts of the interior. It was also noted on the reef about 100 yards offshore, feeding on marine life. Nests containing eggs have been found during March and April. Four eggs appear to comprise a normal clutch. A typical nest, found March 7 in a *caju* tree was close to the end of a limb, about fifteen feet above the ground. The entrance was on the side away from the trunk. It was ten inches in diameter, and was composed of twigs, dead vines, and a few pieces of paper. It contained two eggs and two freshly hatched young.

Cnemotriccus fuscatus bimaculatus (Lafresnaye and d'Orbigny).—Uncommon. My only record is of a female with ovaries slightly enlarged which was shot in dense jungle just south of Recife on February 4, 1945.

Myiobius atricaudus snethlagei Hellmayr.—Not very common. Noted once at Goiana and several times south of Recife, always in fairly heavy jungle.

Myiophobus fasciatus flammiceps (Temminck).—Noted on several occasions in an overgrown pasture. An immature bird was taken in low jungle on October 1, 1944.

Hirundinea bellicosa bellicosa (Vieillot).—One was shot and several were seen at Triunfo, Pernambuco, about 150 miles inland and close to the Paraiba border at an altitude of about 4,000 feet.

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Platyrinchus mystaceus mystaceus Vieillot.—Rare. Several were seen and one was collected in jungle undergrowth at Dois Irmãos Park, Recife, on June 10, 1945.

Tolmomyias flaviventris flaviventris (Wied).—A small, olive-backed flycatcher. Common in the jungle. A male shot on October 22, 1944, was in breeding condition.

Todirostrum cinereum cearae Cory.—A common species in semi-open country, where it shows a strong affinity for *caju* trees. A nest under construction was noted about thirty feet above the ground on April 30, 1944. The species was found also in the high bush country at São Caetano.

Euscarthmornis margaritaceiventer wuchereri (Sclater and Salvin).—This tiny flycatcher was only noted in dense thickets along the coast, where, owing to its excessive shyness, it may be more common than my records indicate. Specimens were secured on October 29, 1944, and May 27, 1945.

Euscarthmornis zosterops naumburgae Zimmer.—A common jungle species, very sedentary in its habits. A male with testes enlarged was collected November 12, 1944. A flycatcher apparently of this species was shot at Custodia (central Pernambuco) in October, 1945.

Elaenia cristata Pelzeln.—Common in brushy country along the coast.

Myiopagis viridicata viridicata (Vieillot).—A fairly common, sedentary jungle species. A male with testes enlarged was collected on November 12, 1944.

HIRUNDINIDAE. Swallows

Progne chalybea domestica (Vieillot).—Fairly common about Recife, where the birds frequently roost on the tops of the city buildings. Common in all towns in the interior. This species was noted gathering nesting material at Equador, Rio Grande do Norte (in the Sertão), on February 13, 1944.

Phaeoprogne tapera tapera (Linnaeus).—Common about the city, in the palm fringe and in semi-open country. Also noted at Patos, Paraiba.

Stelgidopteryx ruficollis ruficollis (Vieillot).—Only encountered once when a flock was found and one specimen collected in the jungle at Goiana on June 3, 1944. The birds were all perched in a large dead tree.

Hirundo rustica erythrogaster Boddaert.—The Barn Swallow is a common winter resident, usually in the vicinity of marshes. The first arrivals appear about the middle of September, and the flocks begin to

gather for their northward migration about the middle of February. The latest recorded spring date is March 19, 1944.

Iridoprocne albiventer (Boddaert).—Common about the swamps and rivers. One pair nested in the eaves of the barracks at the airfield in September, 1944. Also noted at Patos, Paraiba.

CORVIDAE. Crows and Jays

Cyanocorax cyanopogon (Wied).—These handsome jays are confined to the interior where they are usually found in small bands. They are fairly common in the lower foothills near Flores, Pernambuco, close to the Paraiba border, and were also noted at a lower elevation between Patos and Pombal in Paraiba. They are very noisy, uttering a flute-like, rather musical note resembling one of their vernacular names, *pion-pion*.

TROGLODYTIDAE. Wrens

Thryothorus longirostris bahiae (Hellmayr).—Fairly common in thick brush at São Caetano.

Thryothorus genibarbis genibarbis Swainson.—Common in the jungle, where, although rarely seen, its loud, liquid notes are often heard.

Troglodytes musculus musculus Naumann.—This familiar species is fairly common in the vicinity of houses and along the palm fringe. Also observed in the Sertão. One was feeding young still in the nest at São Lorenzo, March 3, 1946.

MIMIDAE. Mockingbirds

Mimus gilvus antelius Oberholser.—Confined to the littoral, where it is relatively common in the scrub just back of the beach.

Mimus saturninus frater Hellmayr.—This mockingbird is abundant in the dry interior, usually in small flocks.

Donacobius atricapillus atricapillus (Linnaeus).—Fairly common in the marshy sections south of Recife, provided there is sufficient brush to afford adequate cover.

TURDIDAE. Thrushes

Turdus leucomelas albiventer Spix.—One specimen collected in the jungle near Recife was of this species. Thrushes are frequently heard in deep jungle, and this bird may be fairly common.

Turdus rufiventris juensis (Cory).—Much shyer than the American Robin, which it strongly resembles. Usually found in medium jungle, but not uncommon wherever large deciduous trees are available for cover. Seen occasionally in parks in the city. Several were noted at Patos, October, 1945.

SYLVIIDAE. Warblers, Gnatcatchers, etc.

Polioptila plumbea atricapilla (Swainson).—One pair was found in an overgrown pasture near Recife. Not common in the coastal zone, but a typical and abundant species in the Sertão.

Ramphocaenus melanurus melanurus Vieillot.—One was collected out of the treetops in dense jungle at Goiana on March 19, 1944.

MOTACILLIDAE. Pipits

Anthus lutescens lutescens Pucheran.—Common in suitable open and somewhat marshy habitats. Often seen on the field at the airport.

CYCLARHIDAE. Pepper-shrikes

Cyclarhis gujanensis cearensis Baird.—A very common species, but it usually sticks close to dense foliage, and would often be missed except for its constant and distinctive singing. Also noted in the interior at Patos and São Caetano.

VIREONIDAE. Vireos

Vireo virescens chivi (Vieillot).—A male with testes greatly enlarged was taken on April 2, 1944, and another specimen collected in jungle on October 8, 1944. Vireos are fairly common in the jungle, but usually escape notice except during mating season when the song is much in evidence.

Hylophilus poicilotis amaurocephalus (Nordmann).—This species was common in the high brush country at São Caetano, about 100 miles inland, in April, 1946. They were usually found in small groups and frequented low bushes.

COEREBIDAE. Honey-creepers

Coereba luteola chloropyga (Cabanis).—Abundant, particularly in the palm fringe, but also found in jungle. Common in the city parks. Apparently rather rare at São Caetano. Nesting takes place throughout the dry season in the coastal zone, but is particularly noticeable in March and April. However, one nest with three young was noted on November 2, 1946. It has been observed that this species frequently builds in close proximity to hornets' nests. The nests are usually not more than ten feet above the ground, and are often in *caju* trees, but are sometimes in the eaves of houses. They are constructed of twigs, and usually lined with palm fiber. On April 7, 1944, nest building operations were observed for several hours. Apparently only one bird was working, although another, probably the male, was heard singing

at frequent intervals near by. On one occasion, six trips were made to the nest in seven minutes, and later seven trips in 13 minutes. The bird was lining the nest, and remained within for periods usually not exceeding five seconds, but did not emerge for 27 seconds in one case. There were intervals up to half an hour when no work was done on the nest.

Dacnis cayana paraguayensis Chubb.—Fairly common in second-growth as well as in the jungle tree tops. Occasional in the palm fringe.

Cyanerpes cyaneus cyaneus (Linnaeus).—Moderately common, usually high up in jungle trees, but sometimes found in lightly wooded sections.

Chlorophanes spiza axillaris Zimmer.—Apparently rare. One sight record is from a jungle near Amaraji, about 60 miles southwest of Recife on February 23, 1946.

PARULIDAE. Wood Warblers

Parula pitiayumi pitiayumi (Vieillot).—A singing male was collected in thick brush at São Caetano.

Basileuterus flaveolus (Baird).—This ground-haunting warbler is common in the jungle. A female simulating a broken wing was noted on November 12, 1944, and a male with testes enlarged was shot the same day. This species is absolutely fearless and will approach within a few feet if the observer remains motionless.

Geothlypis aequinoctialis (velata?) (Vieillot).—Rare. A male was shot on August 29, 1943, in a low bush at the edge of a swamp near the airport. No others were seen in spite of extensive swamp work.

ICTERIDAE. Troupials, Hangnests

Cacicus cela cela (Linnaeus).—A very common species in the palm fringe. Nesting colonies were found in the palms from the middle of November to the middle of January. Also common about *caju* trees a little farther inland.

Molothrus bonariensis bonariensis (Gmelin).—Flocks of this cowbird are not uncommon in open pasture land near Recife. Also noted in the interior of Paraiba between João Pessoa and Campina Grande.

Molothrus rufo-axillaris Cassin.—Three Screaming Cowbirds were noted in a flock of about 40 *bonariensis* in a pasture near Recife on October 22, 1944, and one of them, a female, was collected. Dr. Friedmann, in a letter to the writer regarding this bird, stated that "this constitutes a very remarkable extension of range. This species was not known previously north of extreme southeastern Brazil. In

view of the fact that farther south this species is parasitic almost exclusively on *Molothrus badius*, it is of interest to find that its range extends northward to include that of *M. b. fringillarius*." It is not yet known, however, whether it parasitizes the latter form in eastern Brazil.

Molothrus badius fringillarius (Spix).—A specimen was obtained from a flock of about 20 birds in brush country 40 miles southwest of Recife on June 18, 1944.

Icterus cayanensis tibialis Swainson.—This common species is found almost exclusively in the palm fringe. Several were seen in a small wood between Patos and Pombal in western Paraiba.

Icterus jamacaii (Gmelin).—One was seen in a large tree at the edge of a pasture close to Recife. This species, although rare near the coast, is a fairly common and conspicuous bird in the arid interior.

Agelaius ruficapillus frontalis Vieillot.—A colony of these blackbirds consisting of about 30 individuals was present throughout the year in a small fresh-water marsh near Recife. The first eggs were found on April 23, 1944. Nests containing eggs and newly hatched young, and birds just out of the nest, were noted on May 28. The nests were attached to reeds, and were only about one and a half feet above the water. They were made of rushes, bound together and lined with rootlets. A clutch usually consisted of three eggs.

Gnorimopsar chopi sulcirostris (Spix).—One of these grackles was observed in medium heavy woods about 25 miles north of the São Francisco river in south-central Pernambuco. Apparently not found in the littoral.

Leistes militaris superciliaris (Bonaparte).—Common, usually in flocks in open fields, savannahs and damp meadows. Also observed at Patos and São Caetano.

THRAUPIDAE. Tanagers

Tanagra violacea aurantiicollis (Bertoni).—A jungle species which is fairly common. It is almost always associated in mixed flocks with other small tanagers and honey-creepers.

Tanagrella velia cyanomelaena (Wied).—Rare. One was shot out of a flock of honey-creepers in heavy jungle at Goiana on March 19, 1944.

Tangara fastuosa (Lesson).—This handsome little species is not very common about Recife. It was found under the same conditions as *Tanagra violacea*.

Tangara cyanocephalus corallina (Berlepsch).—Occasional in brushy country, although it is believed to be more common than my records indicate. A female observed on June 20, 1943, was feeding several

almost full-grown young. Also noted in jungle at Amaraji, about 60 miles southwest of Recife.

Tangara cayana flava (Gmelin).—A very common species which is found almost exclusively in brushy sections.

Thraupis sayaca sayaca (Linnaeus).—This is the only species of the family normally found in the parks in the center of the city. It is frequently present in brushy areas close to the coast, and seems to show a preference for the vicinity of human habitations. One was collected at São Caetano.

Thraupis palmarum palmarum (Wied).—A fairly common species in the palm fringe. One was shot in medium jungle. Two fully fledged young were found in a nest in a palm tree in December, 1945.

Ramphocelus bresilius bresilius (Linnaeus).—This striking tanager is not uncommon in low marshy jungle.

Habia rubica bahiae Hellmayr.—One was shot at Dois Irmãos Park, Recife, in heavy jungle, June 10, 1945. Dr. John T. Zimmer, in a letter to Dr. Herbert Friedmann, dated April 17, 1947, made the following comments regarding this specimen. "I cannot match it exactly in our series. It is a young male and from its black bill and large size must be referred to *bahiae* unless it belongs to an unknown new form. It has never been recorded from the neighborhood of Recife or anywhere north of Bahia so there is nothing on record to give a clue. I should not be surprised if it were simply the Bahian subspecies from a new northern locality."

Tachyphonus rufus (Boddaert).—Very common in brushy and cultivated sections but only occasional in low jungle. Also found at São Caetano.

Tachyphonus cristatus brunneus (Spix).—A relatively common bird in the dense jungle at Goiana, where it is usually found in lower growth. It was not observed elsewhere.

Thlypopsis sordida sordida (Lafresnaye and d'Orbigny).—This species is fairly common in brushy country and somewhat rarer in low jungle.

Schistochlamys melanopis olivina (Sclater).—Rather common in bush sections, where it shows a definite tendency to frequent the semi-arid slopes which other birds appear to shun.

FRINGILLIDAE. Finches, Buntings, etc.

Saltator maximus maximus (P. L. S. Müller).—Rather common in all jungle sections and occasional in semi-open country.

Caryothraustes canadensis frontalis (Hellmayr).—This bird has been found on only one occasion when a specimen was collected in lower growth in a dense jungle section at Goiana.

Paroaria dominicana (Linnaeus).—The Brazilian Cardinal is very common near Recife in the brush and in semi-open pasture land, somewhat less so in the palm fringe. This bird is abundant in the dry Sertão, and is the most conspicuous species there with the exception of the ground doves.

Cyanocompsa cyanea cyanea (Linnaeus).—Not a common species. Usually noted in brushy regions between the coastal belt and the Sertão. It was taken at São Caetano.

Spermophila albogularis (Spix).—This seedeater was noted at São Lorenzo and was common in flocks at São Caetano.

Spermophila leucoptera cinereola (Temminck).—Fairly common in brushy country. Also found in savannah and on sugar-cane plantations.

Spermophila nigricollis nigricollis (Vieillot).—A common species in overgrown pastures and cultivated areas. A nest with three eggs was found in a small pine tree close to the beach in March, 1946.

Spermophila lineola (Linnaeus).—A specimen was collected in a bushy section about 15 miles south of Recife on April 2, 1944. Four or five individuals were noted in a bushy marsh on February 4, 1945. Large numbers of these birds appear in the local pet store about this time of year, and it is considered possible that the species is migratory.

Spermophila bouvreuil bouvreuil (P. L. S. Müller).—A very common species in semi-open country. Large flocks gather to feed in the reed beds during the dry season.

Oryzoborus angolensis angolensis (Linnaeus).—This little finch is fairly common in second-growth jungle and thick brushy sections, but it often escapes notice. During the breeding season, in early December, singing males can be heard throughout all suitable areas.

Volatinia jacarina jacarina (Linnaeus).—Fairly common in open fields. A few were noted at São Caetano.

Spinus yarrelli (Gmelin).—A pair was seen in a cultivated section close to the city, and a male about 50 miles south of Recife. Also noted at São Caetano.

Sicalis flaveola brasiliensis (Gmelin).—Abundant in overgrown pastures and cultivated areas about Recife, and common in the city parks. Also common in the Sertão. It is very popular locally as a cage bird.

Coryphospingus pileatus pileatus (Wied).—Not found along the coast, but very common in small flocks throughout the Sertão.

Arremon taciturnis taciturnis (Hermann).—Not common. A shy ground-haunting sparrow found only in the undergrowth in thick jungle.

Myiospiza humeralis humeralis (Bosc).—This rather inconspicuous species is usually found in grassy sections at the edge of marshes and in damp meadows. Two nests containing two eggs each were found on the ground in the latter type of situation on April 18 and October 15, 1944. The nests were in little clumps of grass, were constructed of dried grasses, and measured six by seven centimeters across.

Zonotrichia capensis matutina (Lichtenstein).—This familiar Brazilian sparrow is absent from the coastal regions but is very common at São Caetano. It was noted also in western Paraiba.

Emberizoides herbicola herbicola (Vieillot).—A common species which is found exclusively in marshy sections. Two nests were found on September 17, 1944, one containing two eggs, and the other two young about six days old. The nests were fairly well woven and made of dried grasses. They were securely tied to thick tussocks of dried grasses and were about a foot above the ground.

State Department
Washington, D. C.

GENERAL NOTES

The races of the Black-crested Baza.[1]—The Black-crested Baza (*Aviceda leuphotes* [Dumont]) is widely distributed in northern Siam from February to August and common in the Malay Peninsula from November to March. It has always been assumed that the more southern birds are the northern birds in winter quarters.

I have recently discovered that the wintering population of the Peninsula differs from the breeding population of northern Siam by its distinctly longer wing tip. Seventeen examples of the former have the distance from the tip of the longest secondary to the tip of the longest primary ranging from 80 to 85 mm., while seven of the latter have this distance from 53 to 72 mm.

An indication of the breeding ground of the Peninsular birds is given by the fact that a summer-taken specimen from northeastern Burma has a wing tip of 82 mm., and two summer-taken specimens from northwestern Assam have this measurement 82 and 87 mm., respectively. On the other hand, two examples from southeastern Siam (December, February) have the wing tips measuring 58 and 73 mm., one from Bas-Laos (January) has it 70 mm., and another from northern Tenasserim (January) has it 70 mm.; these thus give a clew to the winter quarters of the population breeding in northern Siam.

Seven specimens taken between October and March at various localities in Annam, Cochinchine, eastern and southeastern Siam have the wing tip ranging from 79 to 84 mm. I suggest that these represent wintering or migrant individuals of the population breeding in southeastern China, which have been named *melli*, but seem to be racially inseparable from those of the eastern Himalayas.

Although the species has not yet been recorded at all from Yunnan nor from any Chinese locality farther north and west than southern Kweichow, the U. S. National Museum possesses a summer-taken specimen from Szechwan. This differs so markedly from any one of a series of 45 examples from other regions that I consider it representative of an unnamed race, which may be called

Aviceda leuphotes wolfei, subsp. nov.

TYPE.—Subadult female, U. S. National Museum No. 297745, collected on Mount Omei, Szechwan Province, China (at elevation 3,000 feet), on August 29, 1923, by David C. Graham.

DIAGNOSIS.—From all individuals seen of other races, distinguished by having the chestnut bars of the posterior under parts, right to the ends of the longest flank feathers, more or less boldly edged with black, and the intervening buffy-white bars only about half as wide as in examples of other races; these two features combine to render the bird strikingly dark-colored beneath.

REMARKS.—That the characters adduced for the new form are not to be explained by immaturity may be judged from the fact that equaeval birds of other races all agree with each other in being less heavily barred beneath than adults and in having the dark bars posteriorly obsolescent.

I have named the new subspecies in honor of Col. Lloyd Raymond Wolfe, U. S. A.

The recognizable races of this cuckoo falcon and their ranges seem to be as follows:

1. *Aviceda leuphotes wolfei* Deignan

RANGE.—Breeding in Szechwan. Winter range unknown.

[1] Published by permission of the Secretary of the Smithsonian Institution.

2. *Aviceda leuphotes syama* (Hodgson)

Baza Syama Hodgson, Jour. Asiat. Soc. Bengal, 5: 777, Dec., 1836 (lower region of Nepal).

Baza lophotes burmana W. L. Sclater, Bull. Brit. Orn. Club, 41: 31, Nov. 30, 1920 (Maliwun, Mergui District, Tenasserim Division, Burma).

Baza lophotes melli Stresemann, Jour. f. Orn., 71: 525, Oct. 15, 1923 (Tsogokwan, Kwangtung Province, China).

RANGE.—Breeding in Kweichow, Kwangsi, Kwangtung, northern Burma, Assam, and the lower slopes of the Himalayas west to Nepal. In winter or on migration known from Annam, Cochinchine, eastern and southeastern Siam, and the Malay Peninsula south to Singapore Island. Birds occurring in Ceylon during the northeast monsoon probably belong here.

3. *Aviceda leuphotes leuphotes* (Dumont)

Falco leuphotes Dumont, Dictionnaire des Sciences Naturelles, 16: 217, Apr., 1820 (Pondicherry).

RANGE.—Breeding in southern India, southern Burma, northern and eastern Siam, northern Indochine (excepting Tongking), and Hainan. In winter or on migration recorded from northern Tenasserim, southeastern Siam, and Bas-Laos.

The arrangement given above is only tentative. The species may well be only a winter visitor to Pondicherry, and the type of *Falco leuphotes* may be a representive of the Nepalese race, in which case Hodgson's *syama* would become a synonym of *leuphotes*, and the birds with shorter wing tips would require a new name. Moreover, it is by no means certain that the form breeding in northern Siam is really inseparable from that breeding, for instance, in Travancore; in so assuming I have merely followed the judgment of others. It is hoped that the conclusions here drawn will induce students with more material from India at their disposal to confirm, correct, or deny them.

For the loan of specimens and for written information on the birds in their charge, my thanks are due the authorities of the Museum of Comparative Zoölogy, the American Museum of Natural History, and the Academy of Natural Sciences of Philadelphia.—H. G. DEIGNAN, *U. S. National Museum, Washington, D. C.*

Additional light on the races of the Dowitcher.—The discovery of an adult breeding specimen of *Limnodromus griseus* from Fort Chimo, Quebec, in the collection of the United States National Museum, is significant in the study of racial variation in this species. There has been considerable doubt as to the distinctness of a race, *L. g. hendersoni* Rowan, comprising the breeding population of dowitchers in the Prairie Provinces of Canada. One of the chief reasons for this doubt has been that *hendersoni* was originally described as distinct from a group of migrants the breeding grounds of which were unknown. Breeding specimens from the west side of Hudson Bay, although not quite the same as the interior breeding birds, were certainly more like them than like the Atlantic coastal migrants assumed to represent typical *griseus*.

For some unknown reason an almost certainly breeding female specimen (U. S. N. M. 94471), taken by L. M. Turner, on June 10, 1883, at Fort Chimo, Ungava (now part of Quebec), has been overlooked until recently. The specimen matches the extremes of the "eastern type" migrants exactly. It is extremely dark above, with buffy markings reduced to a minimum; heavily spotted below with evenly distributed rounded spots, not elongated laterally, or concentrated in a pectoral band as in *scolopaceus;* belly and under tail-coverts whitish in contrast to the reddish

breast. It is assumed that this bird represents the breeding population of the dowitcher on which the name *Scolopax grisea* Gmelin was based. It bears out the belief of Rowan (Auk, 49: 26, 1932) that "the breeding grounds of *griseus* [the type of which came from the coast of New York (*tom. cit.*: 27)] must lie east of Hudson Bay, possibly in the almost unknown interior of Ungava or perhaps even Labrador." On the basis of specimen evidence it is concluded that in migration typical *griseus* is by far the most numerous dowitcher along the Atlantic seaboard north of Virginia, although there is a specimen of *hendersoni* in the National Museum from as far north as Barnstable, Massachusetts. In view of this it is probably legitimate to consider the description of *Scolopax grisea*, based on a bird from the coast of New York, as most likely to be of the eastern type. On the other hand, from Virginia southward along the Atlantic coast, *hendersoni* is almost, if not quite, as common as *griseus*. Even stranger than this, these two races seem to be found commonly, and in almost equal numbers, along the Pacific coast in migration, indicating the possibility that the breeding range of *griseus* may extend considerably to the west of the Ungava Peninsula, possibly even extending completely across the continent to the north of the range of *hendersoni*.

The specimens before me show that *hendersoni* is not only easily recognizable in breeding dress, but in winter and immature plumages as well. The specimens do not support the concept of some authors that *scolopaceus* is a distinct species from *griseus*. There is complete intergradation in all characters. In size the intergradation is with *hendersoni*, but in most color characters the intergradation is with *griseus*. The following tabulation of characters may be helpful in the identification of dowitcher specimens in any plumage, providing comparative series of all three races are available.

CHARACTERS SEPARATING THE RACES OF *Limnodromus griseus*

scolopaceus	*hendersoni*	*griseus*
Adult breeding: Long bill (especially ♀) laterally elongated spots confined chiefly to a pectoral band. Very deep reddish buff below, and on feather edging above. Throat usually speckled. Fairly black above.	*Adult breeding:* Medium bill. Sparse spotting scattered evenly below. Circular spots. Fairly deep reddish buff below. Excessive golden feather edges above with relatively little black.	*Adult breeding:* Short bill. Fairly heavily marked below with circular spots scattered thickly and evenly over breast and throat, which are a relatively light reddish buff. Relatively larger amount of white posteriorly below. Blackest of the three races. Above with feather edgings reduced and not very reddish.
Immature: Very dark above and below. Usually dusky wash on sides. Feather edgings above deep rufescent.	*Immature:* Light above and below. Relatively buffy on chest. Above light buffy feather edges prominent.	*Immature:* Dark and dusky appearing above, feather edges dull and not prominent. Breast band relatively grayish.
Adult winter: Very dark gray.	*Adult winter:* Very light gray.	*Adult winter:* Intermediate shade of gray.

—JOHN W. ALDRICH, *Fish and Wildlife Service, Washington, D. C.*

The present status of the Kagu, *Rhynochetos jubatus*, on New Caledonia.—From observations I made on the island during 1944 and 1945, the extinction of this sole representative of the suborder Rhynocheti in the relatively near future seems probable. I should like to present some obvious factors hastening the process of extermination of this and other species. Unfortunately I am able to propose no remedy for the situation other than the continued support of the French inhabitants and of the authorities in giving the Kagu complete protection.

The Kagu is still to be found in some numbers inhabiting the remote, dense forest and brush of the steep, narrow valleys in the southern mountains of New Caledonia but it is nowhere common. The relatively large size of the island—over 8,000 square miles—and the bird's rather inaccessible habitat have undoubtedly been of primary importance in the perpetuation to the present time of this flightless, ground-nesting species.

Previous to the discovery of the island by Captain James Cook in 1774, the only terrestrial mammals present were the Melanesian natives and the small Polynesian rat, *Rattus exulans*. Neither of these apparently was a serious threat to the Kagu.

However, with the arrival of white man and his predatory followers and domestic animals, the balance was upset and decimation of the Kagu began. Its strange calls and habits and extreme longevity (20 to 30 years is not uncommon for captive individuals on New Caledonia), and the beautiful display of the male made it a prime object of interest to zoos, bird fanciers and museums. This led to trapping and exportation on a commercial basis. The Japanese were the most insidious trappers during this period which reached its peak shortly before the war. During my stay on the island grim evidence of their clever methods was still to be seen. Remains of Kagus were occasionally found firmly grasped by the twisted-stick snares placed in the mountain trails years before. The trappers had set their snares through many miles of this region, and they had visited them only occasionally to remove live birds and leave the dead ones. They seldom destroyed an unsprung set when a trap line was abandoned. Hunting and capturing specimens with dogs was another method commonly used. While meat has always been scarce on the island, the Kagu in its remote habitat never became a primary source of food, although I spoke with some people who had eaten birds killed by their dogs on deer and pig hunting trips.

Other direct effects of white man's activities, though perhaps not of primary importance, are the burning, lumbering and mining that have been carried on over most of this area. While most of the burning on New Caledonia has been restricted to the Naiouli-grass (*Melaleuca*) association, fires have spread during the dry season into the mountain forests and brushlands. Undoubtedly such fires have driven the Kagu from these areas. The mining has usually been of the terrace type and restricted to the ridges, although trails and narrow-gauge railroads have been made through the forests to reach the mines. Logging operations also have demanded similar trails and railroads. In this case they extended through more forest land because the important timber here, Kauri (*Agathis*) and the New Caledonia pine (*Araucaria*), do not occur in dense stands but are usually widely scattered. Cutting timber and brush for the establishment of camp sites for these operations did not do extensive damage to the habitat of the Kagu. However, the black rats and Norway rats, arriving shortly thereafter, built up dense populations at these sites. The overflow of rats from such saturated areas spread out into the surrounding forests.

Of most importance are the predatory mammals which are destroying the Kagu and other species at an apparently ever-increasing rate. Cats and dogs roam the mountains and undoubtedly take a heavy toll of the adults and young and of the single eggs.

Escaped pigs and the introduced rats are also causing heavy damage to the Kagu at the present time. They not only kill the birds but also destroy its food supply of land snails and large earthworms. Although the evidence supporting this statement is not conclusive, I often found snail shells in rat runways and burrow entrances and scattered about in other odd places. Many of these had been gnawed in typical rat fashion. Remnants of completely crushed shells found in the forest suggested the work of pigs because the Kagu itself has a unique method of breaking the snail shell. With a single blow of its powerful beak the shell is cracked about the middle, the body of the snail grasped and the remaining shell quickly removed by vigorous shaking. I observed this in captive Kagus, one of which I had for several months.

In some areas, many acres have been rooted up by the pigs. This continual rooting seems to have destroyed the requisite habitat of the snails and earthworms for I was able to find but few in such areas. The pig and rat may also take young birds and eggs.

Rattus norvegicus was not common in most of the habitat of the Kagu but was taken occasionally far from human habitation. Where lumbering and mining camps were in use, it was present, however, often in considerable numbers. I was unable to determine whether this species remained numerous in these areas long after these camps had been abandoned.

The three subspecies of the black rat, *Rattus rattus rattus*, *R. r. alexandrinus* and *R. r. frugivorus*, however, were found to be common to abundant around the abandoned camps, along forest streams, steep banks and in rotting logs and hollow trees. Their holes, runways, food detritus and feces were abundant in local areas in the mountain forests.

The Sambar deer (introduced) may have an increasingly detrimental effect on the Kagu by the destruction of cover, but during 1945 it was not common enough in the mountain forests of southern New Caledonia to be of importance. Cattle grazing has had no appreciable effect to date.

Thus these factors: (1) decimation by man through trapping and hunting (now prohibited); (2) predation by rats, cats, dogs and pigs; and (3) destruction of natural habitat of both the Kagu and its food supply by pigs, and by mining, lumbering and burning, are all hastening the extermination of this endemic species.—DWAIN WILLARD WARNER, *Laboratory of Ornithology, Cornell University, Ithaca, New York.*

***Microsittace* not different generically from *Enicognathus*.**—Recently we had occasion to examine the specimens in the Museum of Comparative Zoölogy of the two monotypic parrot genera, *Microsittace* Bonaparte, 1854 (southern Chile and Argentina) and *Enicognathus* Gray, 1840 (Chile). Although as species *M. ferruginea* and *E. leptorhynchos* are instantly distinguishable, there seem to be no sufficient characters to separate the genera. Ridgway (U. S. N. M., Bull. 50: 110, 1916), following Salvadori, would separate them on these characters:

> Unguis of maxilla produced, at least as long as rest of maxilla, culmen as long as outer front toe with claw—*Enicognathus*.
>
> Unguis short and strongly decurved, much shorter than rest of maxilla, culmen shorter than outer front toe without claw—*Microsittace*.

The measurements of the culmen relative to a toe prove nothing since the toes may be subject to undetected lengthening or shortening in evolution and there is no reason to suppose this is correlated in any particular way with the evolution of the beak. This is only a convenient way of obtaining relative measurements.

The distinction in the maxillary ungues is striking but not more so than the difference between *Licmetis* and one or two of the other subgenera of *Kakatoë*.

The material at hand contains seven specimens of *ferruginea minor* and one of *f. ferruginea*. The latter's beak falls within the range of the beak of the former, so the two forms are treated as one series. Of *leptorhynchos* there are eight specimens. There is no clear distinction of size between the sexes. The beak length is taken on a straight line from the mid-front edge of the cere to the tip of the culmen and the length of the unguis on a sagittal line from the angle between the maxillary shelf and the ventral face of the unguis to the tip of the culmen.

Averages with their standard deviations are given in the table. All the interspecific differences are statistically significant but the difference in the ratios is the least significant.

	Bill length mm.	*Unguis* mm.	*Unguis/bill length* per cent
ferruginea	20 ± 1.7	7 ± 0.7	34 ± 1.9
leptorhynchos	33 ± 1.2	17 ± 1.4	50 ± 3.2

About half the significance of the difference in lengths can be assigned to the absolutely greater size of the bill in *leptorhynchos*, and if the total length of the bill were the same in the two species, it would be questionable whether the difference in ungual length would be statistically significant.

If the ungues are examined more closely, it is seen that the file on the ventral surface is similar, differing only in a detail indicating that *leptorhynchos* has had the unguis narrowed and elongated without real enlargement. In each species the file rugae form a series of chevrons with their apices posterior. Numerically, we may state the number of complete rugae which are anterior to the maxillary shelf and, following a + sign, the number of incomplete rugae on one side which are interrupted by the shelf. We may also state the approximate angle which the two arms of a chevron make with one another. We have for *ferruginea* about 9 + 2 and approximately 100° and for *leptorhynchos* about 9 + 4 and approximately 40°. This is just the sort of difference one would expect if one narrowed the maxilla of *ferruginea* without addition of substance. The really elongated unguis of *Ara ararauna* shows a file count of 13 + 1 and an angle of about 90°. It is to be noted that a variation in count of ten per cent or more, even between the two sides of the same beak is frequent in parrots and that the angle varies a few degrees in passing along the file.

The feathering and the coloration are remarkably similar in the two species although specific differences are evident. The rimal feathers (eyelashes) are setose (no barbs) in *ferruginea* but have one or two pairs of basal barbs in *leptorhynchos*, a difference that is no more than specific in other parrots. In the former species only the loral and cere feathers are red, but in the latter this color extends onto the forehead a short way and is continued as a narrow line around the eye. The tips of the crown feathers are more extensively black in *leptorhynchos* than in *ferruginea*. In other respects the two are identical even to two uncommon characters: (1) plush-like anterior loral feathers with elongated barbules and (2) tail quills with red barbs and black barbules.

The two species then stand as:

Enicognathus leptorhynchos (King).

Enicognathus ferrugineus (P. L. S. Müller).—James L. Peters, *Museum of Comparative Zoölogy*, and Charles H. Blake, *Massachusetts Institute of Technology, Cambridge, Massachusetts*

Neocichla gutturalis (Bocage) **is a starling.**—Though long regarded as a member of the family Timaliidae, *Neocichla gutturalis* should certainly not be kept in that group. If we must retain a family or subfamily for the babbling thrushes, it can only

be defined as a rather primitive section of the great warbler-thrush assemblage of ten-primaried song birds, including genera with very rounded wings, relatively long outermost primary, and tarsi often scutellate. The wing of *Neocichla* does not conform to such a description and many of its other characters are not thrush-like.

When Bocage described his *Crateropus gutturalis* (Jorn. Sci. Lisboa, 3: 272, 1871—Huilla, Mossamedes), he noticed that its wing differed markedly from that of other members of the genus, the outermost primary being short and narrow, scarcely one-third as long as the next quill, and the third and fourth primaries equal and longest. It was because of the shape of the wing and the length of the upper tail-coverts that R. Bowdler Sharpe, some five years later, proposed for it the monotypic genus *Neocichla* (Layard's Birds of South Africa: 215, 1876) without transferring it to any other family. Professor Reichenow (Vögel Afrikas, 3: 677, 1905) subsequently decided that *Neocichla* was intermediate in character between *Crateropus*, now known as *Turdoides*, and *Turdus* or *Geokichla* because of its pointed wing. The other characters, unfortunately, were not carefully weighed.

Many years ago I was struck with the close similarity of *Neocichla* to certain glossy starlings of Africa. If one could disregard color, it seemed to agree in many respects with *Lamprocolius chloropterus* and *chalybaeus*. To be sure, the only glossy black on *Neocichla* is to be seen on the wings, especially on the greater secondary-coverts; but several other African starlings have little black pigment, particularly *Spreo fischeri* and *Spreo albicapillus*. The latter species has considerable white on the exterior webs of the outer secondaries; and in *Neocichla* this white extends also to the inner webs, on the basal half of the quills. The whole wing of *Neocichla* is proportionately shorter than that of *Lamprocolius*, but the outermost primary is of about the same size. The white tail-spots and light-colored feet, though unusual in African starlings, are paralleled in many Asiatic members of the family.

Other points of which the significance has been overlooked are these: the feet are closely similar in form to those of *Lamprocolius*, not like those of true thrushes; the bill, nostril, and frontal feathering are readily matched in the genus *Lamprocolius;* and the rictal bristles are so reduced as to be almost invisible. The loral feathering is unusually smooth, and merges at its upward edge with the frontal feathering almost exactly as in the glossy starlings, whereas in *Turdoides* the junction with the rather stiff frontal feathers is abrupt.

In juvenal dress *Neocichla gutturalis* is conspicuously streaked and spotted with black on throat and breast. But it is not thrush-like in being spotted on the wing-coverts; and the squamate pattern on hind-neck and back, due to light edgings, is not entirely lost in the adult plumage. Black spotting on the chest is conspicuous in the juvenal plumage of *Pholia sharpii*, another African starling; and both females and young of *Cinnyricinclus leucogaster* are heavily streaked below.

Perhaps it was I who prompted the remark by Dr. Herbert Friedmann (Journ. Washington Acad. Sciences, 20: 434, 1930) that *Neocichla* might prove to be a starling rather than a babbler. But my colleague, Dean Amadon, in his paper on 'The Genera of Starlings and their Relationships' (Amer. Mus. Novitates, No. 1247: 1–16, 1943) excluded *Neocichla* from the Sturnidae. I was absent from New York at the time, and regret that I could not discuss the matter with him. For years I had been placing *Neocichla* among the starlings in the typewritten list of Congo birds which I supplied to a number of ornithologists abroad. In 1944, Mackworth-Praed and Grant (Ibis, 86: 444) agreed with Dr. Friedmann's suggestion that *Neocichla* must be allied to the starlings, and I believe that their brief remarks should be expanded.

One would surely expect significant differences in behavior between a starling and

the babbling thrushes; I regret never having seen *Neocichla* alive. Its range is restricted to a rather narrow belt running from southern Angola to the Luangwa Valley in Northern Rhodesia and to the central regions of Tanganyika Territory. The observations of Dr. R. Böhm, Dr. S. A. Neave, Dr. A. Monard, and Dr. J. M. Winterbottom all show close agreement with regard to its behavior. *Neocichla gutturalis* is very sociable, living in pairs, small parties, and flocks numbering up to thirty or more. It is wary and active, keeping mostly rather high up in the trees of light savanna woodlands, "miombo" or "mopane bush," to which it is largely confined. Its calls are shrill, even confused or parrot-like, and to Böhm and Winterbottom they suggested the voice of *Turdoides*. But it must be remarked that the haunts of *Turdoides* are much more apt to be thickets, and they are eager to keep out of the sight of man.

In October and November, 1929, my friend Frederic G. Carnochan collected two specimens of *Neocichla* in the region of Tabora, Tanganyika Territory. The following year I asked for his opinion of their relationship. Without hesitation, Mr. Carnochan expressed his conviction that they were starlings. He had found them in flocks numbering up to forty or fifty birds in "miombo" or *Berlinia* woods, and noticed that they sometimes fed on the ground in open spots. Natives spoke of them as "ngoye," a name used for glossy starlings as well; and they caught both *Neocichla* and *Lamprocolius* with lime-sticks placed about a small hut or blind. There a boy would hide, holding a live decoy and making it call.

Comparing all the evidence, I find that there is nothing in the known ways of life of *Neocichla gutturalis* that may not be regarded as starling-like. When its nest is found I expect it to be placed in a hollow in a tree. In Tanganyika Territory the breeding season must come during the first half of the rains. Carnochan secured a male with enlarged gonads in early October, Böhm reported one in early December. Flocks of young were seen by Böhm in March, and Loveridge obtained a young bird in full juvenal plumage near Kilimatinde early in that same month. In Mossamedes Province, Angola, Dr. W J. Ansorge took young birds in the latter part of January, and at that season the adults were molting their primaries. So breeding seemed to have taken place about six weeks earlier than it would in East Africa.

Comparison of four adults from Tanganyika Territory with eight from Angola confirms the validity of *Neocichla gutturalis angusta* Friedmann (Journ. Washington Acad. Sci., 20: 434, 1930—Muhulala, Kilimatinde, Tanganyika Territory). Angolan birds, adult and young, all have large whitish areas at the tips of the outer rectrices. In the East African specimens these are much narrower or reduced to mere fringes. I find no significant difference in size; wings and tail of Angolan examples may average a couple of millimeters longer.

I am firmly convinced that *Neocichla* should be assigned to the family Sturnidae, and that it is rather closely allied to *Lamprocolius*, despite the difference in coloration.—James P. Chapin, *American Museum of Natural History, New York.*

A new genus of Sylviidae from the vicinity of Lake Tanganyika.—One of the rare warblers of the eastern Congo, known only from the highland northwest of Lake Tanganyika, was described as *Sylvietta neumanni* by Lord Rothschild (Bull. Brit. Orn. Club, 23: 42, 1908) and figured in color by Doctor Hartert (Novit. Zool., 26, pl. 5, 1919). All but one of the specimens known—and the total scarcely exceeds a dozen—were collected by Rudolf Grauer before 1911 on the highland to the northwest of Baraka at elevations of 1900 to 2000 meters. A single example was secured by J. Sterling Rockefeller and Charles B. G. Murphy in 1929 at Kisale on the Elila River, at a similar elevation.

Except for an abbreviated tail, this bird shows no special affinity to the genus *Sylvietta*, of which nine or ten species are spread over most of tropical and southern Africa. The bill of *neumanni* is markedly broader, its feet are much larger, and its coloration is different from that of any species of *Sylvietta*. There is a much plainer resemblance to the genus *Tesia* of southern Asia, Java, Flores, and Sumbawa, to which four species were referred by J. Delacour (Ibis, [14] 6: 514, 1942). In *Tesia*, however, the tail has undergone still greater reduction and is virtually hidden beneath its upper coverts. I propose therefore to erect a new genus for the African bird:

***Hemitesia*, genus novum**

TYPE.—*Sylvietta neumanni* Rothschild, 1908.

Similar in the form of its flattened bill, rounded wing, and large feet to *Tesia* Hodgson, 1832, but with wings relatively longer, and rectrices extending 12–13 mm. beyond their upper coverts; tail-length, 27–32 mm. The wing-length is 59–65 mm.; 5th and 6th primaries (as counted from outer side) longest. The culmen to base measures 14–15 mm.; width of bill at rear margin of nostril about 3.8 mm. The tarsus is 24–26 mm. long; middle toe with claw 20 mm.; hind toe with claw 14 mm.

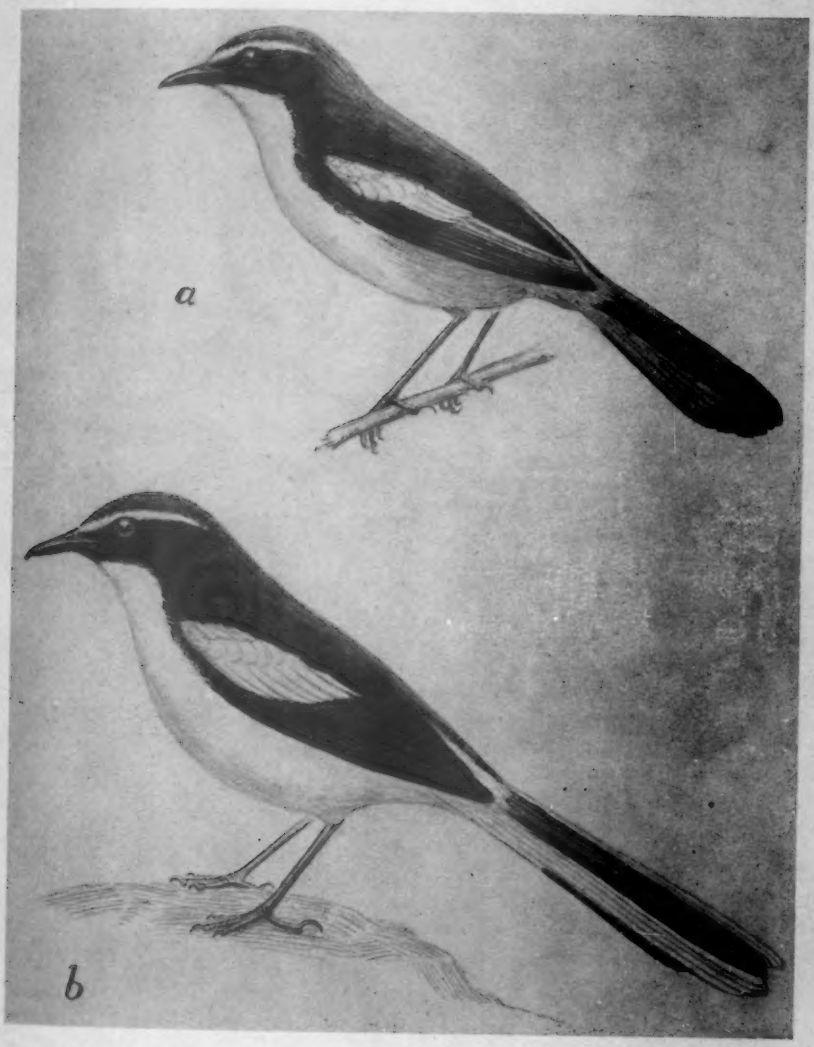
The color-pattern of *Hemitesia neumanni* is distinctive; there is a conspicuous pale yellowish superciliary stripe, bordered with black below, and with a black stripe above at each side of the crown. The mid-line of the crown is grayish. Back, wings, and tail are dark green; the under parts mainly yellowish with middle of abdomen white.

From the form of its feet and from a note on one of Grauer's labels that the bird was secured in a thicket, it would seem more than probable that this warbler lives on or near the ground amidst dense vegetation. It is clearly a montane bird, for it has not been taken below 6,000 feet.—JAMES P. CHAPIN, *American Museum of Natural History, New York, N. Y.*

The Systematic Position of *Xenocopsychus ansorgei* (Plate 8).—Toward the middle of 1946, while studying the various African thrushes or robin-chats of the *Cossypha* group, I looked into the possible relationships of *Xenocopsychus ansorgei*, then known only from the two specimens in the Rothschild Collection, secured by Dr. W. J. Ansorge in 1906 near Lubango (or Lobango) in the Mossamedes Province of Angola. The genus and species were described by Dr. Ernst Hartert in the Bulletin of the British Ornithologists' Club, 19: 82, 1907; and the male type was figured in color in Novitates Zoologicae, 16: 33, pl. 14, 1909. It was not difficult to decide that this member of the thrush family was really a relative of *Cossypha;* but the mystery remained as to why it had not again been collected in forty years, during which not a few experts had explored Angola for birds.

Little did I suspect that the puzzle had recently been solved by Rudolf H. Braun while collecting birds in northwestern Angola. At the end of October, 1946, I received a letter from Mr. Braun telling me that in 1942 he had the good fortune to rediscover *Xenocopsychus* in quite a new region of Angola, near Ndala Tando. He enclosed a couple of pages of notes on its haunts and behavior, which were to be forwarded to Professor Erwin Stresemann at the Berlin Museum.

Professor Stresemann has now related in the Ibis for 1947, pages 123, 124, how the birds were found living in limestone caves, from which they emerged on cloudy days and at twilight. No doubt this fondness for seclusion and shade, together with the scarcity of suitable refuges, explains the rarity of *Xenocopsychus* in collections and even over its extended habitat, for Ndala Tando, or Vila Salazar as it now is called, is some 650 kilometers north of Lubango, the type locality.



Bessonornis humeralis (a) AND *Xenocopsychus ansorgei* (b) ABOUT ONE-HALF NATURAL SIZE, SHOWING THE GENERAL SIMILARITY IN COLOR PATTERN, ALTHOUGH THE SHADED AREAS ON FLANKS, RUMP, AND RECTRICES OF *B. humeralis* ARE RUFOUS.

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I have recently examined two female specimens collected by Mr. Braun, one of them destined for the Berlin Museum. They do not differ noticeably from the Lubango birds, and now I shall give in some detail the conclusions as to systematic position which I reached in the summer of 1946 and explained to Professor Stresemann when forwarding Mr. Braun's notes.

After discussing the possible affinity of this genus to *Copsychus* of southern Asia, the Seychelles, and Madagascar, Dr. Hartert decided against uniting it with *Copsychus* because of slight differences in the frontal feathering, the form of the bill, and the more exposed operculum over the nostrils. He was satisfied that *ansorgei* could not be referred to any African genus, and bestowed on it a generic name that suggested similarity to *Copsychus*. W. L. Sclater in his 'Systema Avium Aethiopicarum,' part 2: 489, 1930, placed *Xenocopsychus* next to *Copsychus* and gave it the vernacular name of "Angola Dyal-bird." With our present knowledge we shall do well to substitute "Angola Cave Chat."

The male and female in the Rothschild Collection gave me the opportunity of making comparisons with *Copsychus*, *Kittacincla*, *Cossypha*, and some other genera. Mr. Braun's specimens only confirm my belief that Dr. Hartert's decision to separate *Xenocopsychus* from *Copsychus* was well taken. Neither do I find it closely allied to *Kittacincla;* it has more in common with some of the larger species of *Cosspyha*. The pattern of the tail, with black median rectrices and a black stripe down the outer web of the outermost tail-quill, is very similar to a style of pigmentation often seen in *Cossypha*. But the lighter areas on the rectrices are white in *Xenocopsychus*, not rufous.

Rather closely allied to *Cossypha* is a bird of southern Africa known as *Bessonornis humeralis* Smith. It, too, has a tail with a definite pattern of black and rufous; in some other ways it shows a slight resemblance to certain species of *Erythropygia*. When one compares the arrangement of colors about the head, the white superciliary stripe, black lores and cheeks, and the white areas on the upper wing-coverts, one cannot fail to be impressed by the close similarity between *Bessonornis* and *Xenocopsychus*. The latter, to be sure, has more black on the chin; and the white of the wing-coverts, though slightly more extensive, does not extend posteriorly to the outer margins of the inner secondaries. Yet the resemblances in form and pattern are so numerous that I cannot doubt the close relationship of *Xenocopsychus* to *Bessonornis*. If the size of *B. humeralis* could be increased until the wings were 20 per cent and the tail 42 per cent longer, the black removed from the tips of the outer rectrices, and all the rufous in its plumage bleached to pure white, the result would be a bird extremely similar to *Xenocopsychus ansorgei*. Such changes would seem of no serious import in classification.

With regard to difference in size, it woud not be out of place to compare *Cossypha albicapilla* with *C. niveicapilla*. Their color pattern is very much the same; but the wing-length of the latter species would have to be increased by 25 per cent, its tail by 35 per cent, in order to equal the size of *albicapilla*. The extension of black onto the chin of the larger species is not without interest. We have, of course, no good grounds for assuming that the loss of all rufous color in *Xenocopsychus* is connected with its cave-dwelling habits, but such a speculation may be permissible.

To me it seems plain that *Xenocopsychus* is a member of the *Cossypha* group, rather long-tailed and lacking any rufous color. The sketches will serve to show the relatively slight differences in pattern between *Bessonornis humeralis* and *Xenocopsychus ansorgei*. It is likely that the latter will long remain a rarity in museums.—JAMES P. CHAPIN, *American Museum of Natural History, New York.*

Names of the Snowy Owl.—The specific names *scandiaca* and *nyctea*, both of Linnaeus (Systema Naturae, ed. 10, 1: 92, 93, 1758), have been used for the Snowy Owl, and Einar Lönnberg (Ibis, 13th Ser., 1: 306, pl. 12, 1931) calls attention to the page priority of the former term.[1] He was correct but the factors concerned, some puzzling, have not been reviewed in English. The treatment of the owls in the Systema Naturae traces directly to that in the Fuana Suecica (1746, pertinent pages 16, 18). In both works, Linnaeus divided the owls into "eared" and "smooth-headed" sections and had a large, whitish owl in each group, based on pictures by his preceptor, Olof Rudbeck.

The "uneared" bird (*nyctea*) is the Harfäng of the Swedes, so-called to this day; the other (*scandiaca*) was consistently described, in the works referred to, as "*S[trix] capite auriculato, corpore albido.*" In the earlier Fauna Suecica, its "eared" condition was thus further emphasized: "*Similis Noctuae* 54 [i. e. *nyctea*] *ni supercilia aurita adessent in hoc Bubone.*" Thus, from the texts alone, *nyctea* was a "hornless," and *scandiaca* a "horned," owl—a difficulty not resolved by Lönnberg's article in The Ibis. The fact that there is no normally whitish, horned owl in Scandinavia is not conclusive, as an albinistic *Bubo* could have been involved and, in fact, such a bird was described by M. J. Brisson (Ornithologie, 1: 486, 1760) as *Bubo laponicus* (Grand Duc de Laponie).

It is, therefore, gratifying to have the following elucidation of the puzzle adapted from a letter of March 15, 1947 kindly prepared by Dr. Ulf Bergström of the Naturhistoriska Riksmuseum, Stockholm. Olof Rudbeck, Jr. made two pictures of whitish owls. One, No. 27, represents an old female of the Snowy Owl; it has no "ears," and was labelled by the artist, "*Noctua Scandiana maxima ex albo et cinereo variegata.* Största svenska Uglan" [Greatest Swedish Owl]. The Latin part of this wording was quoted by Linnaeus in the description of *Strix nyctea* in the Systema Naturae. Rudbeck's picture, No. 30 (reproduced in the Ibis article) illustrates an apparent Snowy Owl, which, however, has indications of "ears." From the legend of this picture, the name, *Bubo scandianus*, was quoted by Linnaeus in the Fauna Suecica to which account he refers in the Systema Naturae under the name *Strix scandiaca*.

From Linnaeus's notes on Rudbeck's lectures on birds, it is evident that Rudbeck failed to recognize that the two plates represented the same species. Thus Linnaeus, who had no personal experience with the bird, founded his descriptions entirely on Rudbeck's pictures and words and perpetuated his teacher's misconception of the case. "In fact," writes Doctor Bergström, "the feathers above the facial ruff are elongated although the bird does not raise them as does a *Bubo* or an *Otus* with their considerably bigger tufts." To sum up: Rudbeck pictured two specimens of the Snowy Owl, one with the vestigial "ears" visible (reproduced in the Ibis contribution) and another with a smooth head. Of Linnaeus's descriptions based on these pictures, that referring to the bird as "horned" and otherwise less satisfactory, has page priority and under nomenclatorial practice the name, *scandiaca*, it defines must be adopted.[2]

As a digression, it would seem that the feathers developed into plumicorns (a term of Coues who makes the same point) in some species are present in all owls. differing greatly in degree of expression. As they arise above the eyes, they should not be

[1] Page priority is not recognized by the International Rules of Zoological Nomenclature.—ED.

[2] Nilsson, Orn. Svecica, 1: 56, 1817 pointed out the Rudbeckian origin of both names and their identity, and adopted the name *nyctea*, but his action is uncertainly acceptable as that of a first reviser since he ascribes both names to Linnaeus's 'Fauna Svecica,' not the 10th edition of the 'Systema Naturae.' Various later revisers who accepted the synonymy but adopted *scandiaca* used the 12th edition as a basis. It may well be that Lönnberg (Festsk. Uppsala Univ. minnef. : 220, 1930) will prove to be the true first reviser of the 10th edition names.—ED.

called ears, aurae, Federohren or the like, indicating a lateral position or origin.—W. L. McAtee, *Chicago Illinois.*

On type localities of Catesby.—It is disappointing to find that Aldrich in his recent review of the races of the Bob-white (Auk, 63: 498, 1946) has followed the fourth edition of the A. O. U. Check-List in designating South Carolina as the type locality of *Tetrao virginianus* Linnaeus. Linnaeus based his name on the bird which Catesby (Natural History of Carolina, etc.) called the American Partridge, *Perdix sylvestris virginiana*. The action of the Check-List Committee was in part based on error, as they cite Catesby's name for the Bob-white as *Perdix sylvestris americana* (Check-List: 88). Catesby spent seven years in Virginia. Aldrich implies that Catesby did not include observations made during this period in the 'Natural History' but cursory examination of its pages reveals that he frequently mentions Virginia in giving the ranges of birds. Of the Baltimore Oriole he writes that it is found in Virginia and Maryland but not Carolina. On the same plate with the Bob-white, Catesby figured a lily which he called *Lilio narcissus virginiensis*. Everything considered, there is no reason whatsoever to make the confusing decision that Virginia should not be the type locality of *Tetrao virginianus*. Since this name directly designates a type locality, we are free to disregard attempts to change it to Carolina and to follow Peters (Check-List Birds World, 2: 47, 1934) who has correctly indicated Virginia.

There are enough genuinely confusing situations in nomenclature without multiplying them needlessly. So far as Catesby's work is concerned, one very unfortunate example of the latter type of activity was the restriction of the type locality of the Blue Jay in such a way as to require the renaming of the northern subspecies (Oberholser, Auk, 38: 83, 1921). Coues had long before named the southern subspecies. Since Catesby mentioned no locality, it would have been a simple matter to continue to use *cristata* for the northern Blue Jay, with or without a designation of a more restricted suitable type locality. Ridgway [U. S. Nat. Mus., Bull. 50 (pt. 3): 351, footnote, 1904] thought that on the basis of both size and color the best dividing line between the northern and southern Blue Jays occurs at the northern base of the peninsula of Florida. Stone (Auk, 46: 447–454, 1929) in a discussion of type localites based on Catesby, made the sensible proposal that the decision of the first reviser for each species concerned be accepted. If this suggestion is followed, *cristata* can be used for the northern Blue Jay and *florincola* for the southern. Oberholser himself (The Bird Life of Louisiana: 419) recorded the northern Blue Jay from as far south as Louisiana. It probably occurs in South Carolina. If so, it can be claimed that Catesby's description *might* have been based on the northern subspecies. In Opinion 107, The International Commission on Zoological Nomenclature has stated as a general principle that "a name in current use is not to be supplanted by an earlier but rarely adopted or an unadopted name unless the argument is unambiguous and unless the premises are *not subject to difference of opinion*" (italics mine). Rigorous application of this sensible opinion will prevent many attempts to change established names on the basis of difference of opinion as to the subspecies represented by old types, or on similar pretexts.—Dean Amadon, *American Museum of Natural History, New York, N. Y.*

***Sarcocystis* (*Aspergillus*?) in wood warblers.**—On August 9, 1944, near Columbus, Ohio, one of us (G. H. B.) collected an immature male Black and White Warbler (*Mniotilta varia*). Upon preparing it as a study skin, the bird was found to be heavily infected with *Sarcocystis*. This experience was repeated with an adult male Mourning

Warbler (*Oporornis philadelphia*), taken near Cheat Bridge, Randolph County, West Virginia, June 14, 1945. Both birds appeared to be in healthy condition.

Two species of wood warbler, the Olive-backed Warbler (*Parula pitiayumi*) and the American Redstart (*Setophaga ruticilla*) have previously been recorded as hosts for this organism (Erickson, Auk, 57: 114–119, 1940). As far as we have been able to determine, *Sarcocystis* has not previously been recorded from the species mentioned above.

Spindler and Zimmerman (J. Parasitol. suppl. to Vol. 31: 13, Dec., 1945) reported the species infecting swine to be a fungus (*Aspergillus* sp.), rather than a protozoan. It is possible that the avian species will be found to have a similar life cycle.—George H. Breiding, *Ohio State University, Columbus, Ohio*, and Robert L. Rausch, *University of Wisconsin, Madison, Wisconsin.*

Parasitic Dipterous larvae from the nasal cavity of a nestling magpie.[1]—An interesting variation in the parasitic habits of *Protocalliphora avium* Shannon and Dobroscky was observed while rearing a nestling magpie, *Pica pica hudsonicus*. Jellison and Philip (1933) recovered numerous larvae and puparia of *P. avium* from nests of magpies and crows in western Montana. From five magpie nests they took 108, 187, 190, 343, and 373 larvae, respectively. Avian erythrocytes were demonstrated in the foregut contents of dissected larvae. The magpie nestlings appeared healthy, with only minute lacerations on the breast to indicate feeding by the maggots.

Arnold (1919) and others have recovered *Protocalliphora* larvae on and in fledglings, with death of some birds attributed to maggot attacks. Recovery of larvae was reported from wounds in the body and head of nestlings, although no infestations of the nasal cavities were reported.

On the afternoon of June 3, 1939, the writer obtained near Bozeman, Montana, a nestling magpie, still unable to stand by itself. Movement was detected in both nares, but the nature of the infesting forms could not be determined. From the right naris there came a slight black exudate. A nest was improvised for the young bird, with a white cloth lining the bottom of the nest box. During the same evening the bird was examined in semi-darkness, and a maggot was found protruding from the right naris. The first attempt to grasp this larva was unsuccessful as it retreated quickly when exposed to illumination. The specimen was finally extracted by using a bent pin. Movement was still detectable deep in the nasal cavity. The following morning (June 4) a second maggot was collected, in this instance from the cloth lining of the nest box. The next morning (June 5) four more larvae had fallen to the floor of the nest box. No further movement could be detected in the nasal cavities of the bird, although observation was difficult. On the succeeding morning (June 6) four more larvae were found in the nest box. These were the last specimens recovered from this bird. During the four days of larval emergence the nestling magpie showed no irritability other than that provoked normally by hunger. There was no evidence of the skin lesions reported by several authors.

Six larvae were placed in sand. None had pupated on June 10; two puparia were present on June 16. A single adult fly emerged on July 3. Dr. C. W. Sabrosky has identified this specimen as *Protocalliphora avium* Shannon and Dobroscky.

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[1] Contribution from the Department of Zoology and Entomology, Montana State College, Agricultural Experiment Station. Paper No. *192* Journal Series.

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—D. D. PLETSCH, *Agricultural Experiment Station*, Montana State College, *Bozeman, Montana.*

A Contribution to the Food Habits of the European Magpie (*Pica p. pica*).—During the winter of 1946 I found a roosting place of Magpies near the village of Kovarce, Slovakia, in a thicket of blackthorn (*Prunus spinosa*) and virgin's bower (*Clematis vitalba*) about 160 m. long and 20 m. wide. Some 50 birds roosted here in the winter and 11 pairs nested in 1946, the minimal distance between two nests being 3 m. In March I found 250 pellets, averaging 17 x 29 mm. in size and 1.1 grams in weight. They contained 254.16 g. of vegetable matter, 22.48 g. of animal matter, and 12.36 g. of mineral matter. The vegetable matter consisted of: weed seeds—smartweed (*Polygonum*), charlock (*Sinapis arvensis*), corn cockle (*Argostemma githago*), couch grass (*Agropyrum repens*), speedwell (*Veronica*), brome grass (*Bromus sterilis*), chess (*B. arvensis*), the last two most important; cultivated grain—maize (*Zea mays*), wheat (*Triticum*); seeds and haws—dog rose (*Rosa canina*), very abundant, blackthorn, English hawthorn (*Crataegus oxycantha*), black locust (*Robinia pseudacia*). The animal food consisted of 8.29 grams of vertebrates: bones of house mouse (*Mus musculus*), harvest mouse (*Mus minutus*), field vole (*Microtus arvalis*), spermophile (*Citellus citellus*), common mole (*Talpa europea*), white-toothed shrew (*Crocidura leucodon*), pig (*Sus scrofa domestica*), dog (*Canis domesticus*), Yellow Bunting (*Emberiza citrinella*), Skylark (*Alauda arvensis*), Partridge (*Perdix p. perdix*), an undetermined bird; 5.7 grams of mollusks: shells of snails (*Helicella obvia, Monacha incarnata, Era tridens, Abida frumentum*); 8.49 grams of arthropods: Coleoptera—weevil (*Otiorhynchus*)—very abundant, dung beetles (*Geotrupes*), carrion beetles (*Silpha, Aphodius*); Dermaptera—earwig (*Forficula auricula*) 319 cerci. The mineral matter consisted of grit, fragments of brick and porcelain.

I think that much of the grit and seeds was taken incidentally with animal food. Particularly interesting is the relatively great number of earwigs eaten, about 160 individuals. This is the first paper based on pellet analysis of the Magpie in Slovakia. Further study and collecting of pellets were not possible because the roosting place was destroyed by men in the summer of 1946. I wish to thank Prof. Babor of Bratislava University for determination of the snails, Dr. Korbel, Curator of Zoology, Bratislava Museum, for determination of the arthropods, and Mr. W. L. McAtee and Mrs. Margaret M. Nice of Chicago for advice in writing this report.—FRANK TURČEK, *Forester, State Research Institute for Forest Protection and Wildlife, Banská Štiavnica, Czecho-Slovakia.*

Marsh Hawk kills Baldpate.—On September 21, 1943, at about 1:15 P. M., I observed a Marsh Hawk kill an apparently normal and healthy Baldpate. The method and proficiency with which the capture was made would lead one to believe that the procedure had been successfully tried before.

The hawk (a dark-colored bird, probably an adult female) was first seen hovering and diving over a small flock of Baldpates in a narrow slough about one mile south of Upham, North Dakota. Three or four ducks were diving as the hawk maneuvered over the water. One bird was apparently then singled out for attention and the others flew or swam a short distance away. As the individual reappeared at the surface the hawk dropped close with the legs carried away from the body. This caused

the duck to dive again. During possibly 10 to 15 repetitions the hawk struck the surface of the water with legs and body several times, but quickly recovered altitude in each instance. It then seemingly grasped the duck and rested on the water for four or five seconds, then flew up again. Soon the duck reappeared at the surface and was immediately seized by the hawk, which rested on the water for perhaps two minutes before attempting to fly and drag its prey shoreward into the wind. The duck gave no further sign of life and the hawk made five attempts to get it to land, flying about between attempts. The edge of the slough was choked with pondweeds and but little headway was made. While trying to move the duck, the hawk flew without touching the surface.

At this time I frightened the hawk away as I approached. I retrieved the duck about 25 feet from shore in 'kneedeep' water. It was an immature bird, fully feathered and, I am sure, capable of normal flight. It weighed 1003 grams. Autopsy disclosed a minor head wound extending into the flesh, with a small section of skin removed. Other wounds may have been present, but were not noticeable. The right auricle was ruptured and there was considerable blood in the thoracic cavity.

This episode was viewed at a distance of 100 yards or closer with 7 x 35 Bausch and Lomb binoculars and all participants were in full view from my car window. There was a strong northwest wind, which may have aided the hawk in its hovering attitudes.—MERRILL C. HAMMOND, *U. S. Fish and Wildlife Service, Lower Souris Refuge, Upham, North Dakota.*

Cowbird tragedy at Prothonotary Warbler's nest.—On May 22 1941, I visited a small colony of Prothonotary Warblers in swampy woods on the south shore of the Grand Reservoir (Lake St. Marys) in Mercer County, Ohio. A dead female Cowbird was seen, lodged in the entrance to a cavity of a small willow stub. Although the body was badly decomposed, considerable force was necessary to dislodge it. The barbs of the primary feathers seemed to act as hooks. The nest held a single typical egg of the Prothonotary Warbler. I anticipated that the abdomen of the Cowbird would contain a perfect egg and upon opening it, I found this to be the case. I recall finding Cowbird eggs in two or three Prothonotary nests in this colony in previous years. The late Charles Dury of Cincinnati probably knew this colony many years previously.—HOMER F. PRICE, *Payne, Ohio.*

Red-winged Blackbird caught in a crotch.—When on a field trip on May 13, 1937, along Duck Creek, Davenport, Scott County, Iowa, I came upon a dead Red-winged Blackbird (*Agelaius phoeniceus phoeniceus*) that had garroted itself in a crotch of a small sapling. Evidently it had tried to alight on a small limb of the sapling, had slipped, and caught its neck in the crotch where it struggled to get free but only worked its neck down tighter into the crotch. The body was still warm when I found it and the plumage was in excellent condition except for the neck that was in the crotch. This area is unfrequented by people and I was near by all day and saw no one, so the evidence seems to indicate that it was one of those tragedies in the avian world.

Similar accidents have been recorded by Olin Sewall Pettingill, Jr. (Auk, 63: 591, 1946) of a King Rail caught in a barbed-wire fence and by William P. Baldwin (Auk, 63: 96, 1946) of a cormorant that had been similarly caught in a split pole.—JAMES HODGES, *3132 Fair Avenue, Davenport, Iowa.*

Cooper's Hawk 'drowning' its prey.—The note by Frederick C. Schmid in The Auk, [64 (2): 307, April, 1947] entitled, 'Unusual behavior of a Cooper's Hawk,'

leads me to report an observation made on the behavior of the same species in captivity.

In the Washington zoo we have a few examples of the Cooper's Hawk (*Accipiter cooperii*). In captivity the species appears nervous, and as a rule does not take kindly to a cage. However, one example has settled down to cage life and is thriving. The diet consists of horse meat, English Sparrows (*Passer domesticus*) and at times mice. The bird in question is a female, and upon seizing its "prey," hops on one foot (the other being occupied with its food) toward the watering pool in the cage. Here the bird jumps in and submerges itself up to its body, thus keeping the food under water. After a few seconds it jumps out of the pool and devours its food, protecting it by spreading its wings outward in typical Accipiter fashion.

I have observed this manner of feeding many times, but it did not occur to me that the hawk was "drowning" its prey prior to feasting upon it.—MALCOLM DAVIS, *National Zoological Park, Washington, D. C.*

Nocturnal fresh-water wandering of the Black Skimmer.—Since I have seen nothing published concerning the night wandering of the Black Skimmer to bodies of fresh water, a report on this little-known practice may be of interest. During my many years of residence in Florida, I had never observed this species anywhere but on the sea coast or in the waterways immediately bordering it until the early 1930's. Between February 4, 1934, and March 2, 1939, these birds were observed, mostly at night, on numerous occasions in the immediate vicinity of Orlando, approximately 40 miles from the nearest salt water to the eastward; several were seen, also, during the daytime. In April, 1933, I recorded a single individual seen feeding in a fresh-water canal on a bright, sunny day, 12 or 15 miles west of Vero Beach. A flock of some 35 to 40 was seen closely bunched on a sandy bar on the western shore of Lake Okeechobee, Glades County, by Wray H. Nicholson and myself, in May, 1946.

The majority of the Orlando records were made at night. Apparently the Skimmers seldom arrived before 7:30 P. M. and usually later—around 9:00 or 9:30—and were not seen in the morning, so it may be assumed that they left the coast about dusk and flew inland, remaining all night and returning before daylight. The journey was made primarily for feeding since the birds constantly flew low over the lakes, often skimming the water. During the many times I saw these birds, I heard the peculiar and distinctive barking notes only once—the very dark night of January 23, 1939. The calls were heard continuously for five minutes. On February 4, 1934, Hugo Schroder saw ten Skimmers on Lake Eola, in Orlando, and also heard the calls. He reports that a few nights before, he had seen them on the same lake.

My other detailed records, all for Orlando, are as follows:

April 26, 1934.—A lone Skimmer seen at night, about 10:00 P. M.

May 31, 1934.—I saw a lone individual skimming the water on Lake Cherokee, about 8:30 P. M. Watched for 15 minutes as it circled the lake many times.

June 2, 1934.—I saw two feeding by skimming the surface of Lake Lucerne, about 10:00 P. M. Birds came within ten feet of me.

June 4, 1934.—I saw at close range, two Black Skimmers on Lake Eola, during a political rally, in the full glare of electric lights and with hundreds of people near by. Birds came close to the crowd and were silent.

February 5, 1936.—Four seen about 5:30 P. M.; day cold, 58° and drizzling rain.

December 24, 1937.—A lone Skimmer on Lake Lucerne, at 9:45 P. M.

January 17, 1939.—Seven seen on Lake Eola, about 9:30 P. M.

January 18, 1939.—Ten or more seen on Lake Eola between 7:20 and 7:40 P. M.

March 2, 1939.—Major E. A. Goldman and Donald J. Nicholson saw four about 9:30 on Lake Eola, and again 15 minutes later. We remained 40 minutes longer and saw them again, but no calls were heard.

April 15, 1947.—At nine o'clock sharp in the evening I saw and heard six Black Skimmers on Lake Eola in the center of the city. I stood on the bank of the lake close to an electric light, and six birds passed within ten feet of me. They were skimming the water with their bills and were within a few feet of each other in staggered formation. Soon they began to come from both directions and in passing, each bird uttered a low but sharp *ut-ut* note. While the birds were travelling in a group going in one direction they were silent, but each time they crossed, *i. e.* birds meeting from opposite directions, each saluted with the double *ut-ut* note. Skies were overcast and it had just finished showering.

There were a number of other sight records of night-visitation to these Orlando lakes that I failed to record, and I think it was a year or two before 1934 that I saw the birds for the first time in Orlando.

Flying a round-trip of 80 miles, with continuous all-night flight over the lakes adding many more miles to their nocturnal wanderings, indicates remarkable vitality. What special foods they might have been seeking in the interior and why it was necessary to make the strenuous trek is most intriguing and puzzling.—Donald J. Nicholson, *Orlando, Florida.*

A loose-feathered Nighthawk.—Included among the members of The American Ornithologists' Union there must be at least several banders who have trapped adult Eastern Nighthawks (*Chordeiles minor minor* [Forster]). To those banders and to any other members may I please address this appeal for information?

On June 20, 1945, I trapped a female, the only member of this species I have ever handled. During the banding procedure a conspicuous number of her body feathers loosened and fell at my feet. Since it appeared to be a normal case of molting I failed to give the situation more than passing consideration, nor was it even mentioned in a brief study of this bird's behavior published in Bird-Banding, 17 (2): 55–60, 1946.

She returned to nest on the same roof again during the summer of 1946. Upon this occasion she was not trapped, but the band was observed closely enough for certain identification. A 'General Note' in Bird-Banding, 17 (4): 168, 1946, reported her return.

This bird nested on the same roof again this season (1947). On June 19, I trapped her and this appeal for information is an attempt to explain an incident which occurred while she was in momentary captivity. When the draw-string was pulled the bird seemed not even to notice the door of the flat trap as it swung shut. She remained motionless, quietly incubating the two eggs over which the trap had been set. In fact, it was not until I had approached within five feet of the trap that she rose from the eggs and attempted to escape. I moved the trap at once away from the eggs to insure against breaking them. While the trap was being moved the Nighthawk hovered, fluttering, in the air. She flew against the chicken-wire sides and top not more than a half-dozen times. She was very tame and at no time was her struggling at all violent.

When the trap was set down the bird came to rest on the floor and crouched there quietly while I reached in and picked her up. While she had been fluttering about, some long feathers became loosened and fell to the floor of the trap. While I held her I discovered several of her primaries and some of her tail feathers were so loose that they fell out of place even while I examined them.

(*Upper*) ELIOT: GREEN-TAILED TOWHEE IN MASSACHUSETTS. (Photograph copyrighted by Mary S. Shaub.) (*Lower*) ABBOTT: SUTTON'S WARBLER IN VIRGINIA.

Once the band number had been assured I released the bird and took inventory of the feathers she had lost. They comprised five long primaries from her left wing, three of the longest primaries from her right wing, and two tail feathers. Three small body feathers were also found.

Has this shedding of feathers been observed by other banders who have trapped this species, or did I capture a specimen at the moment of her most active molting? Was the 'throwing' of her feathers the result of a violent nervous shock caused by her capture? I shall appreciate very much learning from anyone who has handled nighthawks whether such shedding is a normal occurrence.—G. HAPGOOD PARKS, *Hartford, Connecticut.*

Green-tailed Towhee at Northampton, Massachusetts (Plate 9).—On December 31, 1946, a very strange bird appeared at the feeder of Mr. and Mrs. Edward Risley, near the southern edge of Northampton, Massachusetts. It consorted with Juncos, but its tail was longer and without white, its body-size larger, and its throat white. For several days they puzzled over it, noting further its chestnut cap, the dark line at each side of the throat, and the yellow-green lining of its tail, and hearing it mew, somewhat like a Catbird. Unable to find anything to match it in the bird-books they possessed, Mrs. Risley finally telephoned to me on January 3, and as she mentioned the above points, one after the other, my imagination synthesized them into a picture of a Green-tailed Towhee (*Chlorura chlorura*), a species which I had never seen alive but only in colored portraits that fortunately stuck in my memory. With keen excitement, therefore, I donned overshoes and tramped through slush and drizzle a mile or more to the Risley home; and after a short wait I saw the bird come to the feed scattered below the kitchen window. Visibility was very poor and the bird's colors appeared very dull, but the notes I made were later compared with the description in Ridgway's 'Birds of North and Middle America,' which made the provisional identification positive and seemed to indicate that the bird was an adult female. It later turned out to be a first-year male, for by mid-March it was occasionally singing.

This was a first-ever record for New England! The only other in the Northeast that I can find was in New Jersey, near Overpeck Creek, December 23, 1939, to January 30, 1940, a significantly comparable season. With the Risleys' consent, I telegraphed or wrote to a number of friends, and word of the unprecedented visitor spread far and wide. About a hundred people signed the guest-book that the Risleys opened for them, and many other observers stayed outside the cottage or hunted up the bird in neighboring thickets. It liked a big forsythia where a manure-heap raised the temperature, and rhododendrons, and piles of brush whereof several remained in the vicinity until spring. Constantly I expected it to vanish, but the winter was less severe than usual, and week after week it was reported to me. For fear of scaring it away, the Risleys would not permit trapping and banding, but it *was* possible for Mrs. Mary S. Shaub to make several close-up photographs of it—proof to future investigators that it really did occur! (*See* Plate 9.) From January 22 on, its favorite companion was a White-throated Sparrow (*Zonotrichia albicollis*), and as it matured its behavior towards this female White-throat became more and more devoted. In April it came but little to the feed but could be found near by, always with the White-throat. On April 15, Mrs. Risley had her last look at it, closely following the White-throat and apparently courting it. We supposed that the White-throat went north that evening with the Green-tail in pursuit, but on April 26 a group from Pittsfield found it moping by itself in the forsythia! What happened next, nobody knows.

One guesses that this youngster on its first migration mistook east for south, and wound up in New England instead of México. The mistake may have no scientific significance, but it provided many New England birders with a happy thrill.—SAMUEL A. ELIOT, JR., *Smith College, Northampton, Massachusetts.*

Sutton's Warbler at Fort Belvoir, Fairfax County, Virginia (Plate 9).—On August 23, 1947, at about 10:00 a. m., Mr. George Sigel and the writer, both of the Washington, D. C., Audubon Society, were birding in a mixed oak-gum-tulip woods on the north side of the Belvoir peninsula, about one air mile south of Mt. Vernon, on the Potomac River. We were watching a flock of mixed warblers moving through the low trees along a woods path. Among the flock of Parula, Black and White, Chestnut-sided, Hooded, and Yellow-throated Warblers was one adult male Golden-winged Warbler in a small gum tree which we were observing at a distance of about 30 feet. Another warbler, which I at first took to be a Parula, flew into the tree with the Golden-winged Warbler. I casually examined it through my 8× glasses and immediately noticed that although the bird's plumage was that of a Parula from the neck down, this bird possessed a white stripe over each eye in addition to a semicircular white eye ring about the lower half of the eye and, most noticeable of all, had an elongated patch of black running from below the eye to the ear-coverts. There were three or four short black streaks on the sides of the breast, just below the black facial markings, and a light lemon yellow wash on the throat and upper breast.

The warbler was actively engaged in catching insects and quickly disappeared into a near-by oak where it was lost from sight for several minutes. The flock moved slowly through the trees along the path to a point where there was a tiny clearing to the right of the path. It was here I again found the unusual 'Parula Warbler' eating a caterpillar while perched on an oak branch only eight feet above the path and 15 feet from us. For the next ten minutes we both had excellent views of this warbler in many poses and in good light at a distance of 20 to 40 feet as it fed through the outer branches of a tulip tree.

I made a sketch on the spot of its head markings (*see* accompanying sketch) and compared the bird with the colored plate in Peterson's latest field guide, a copy of which we had with us. Our bird differed from Peterson's figure in that the upper part of the head was slate gray rather than black. Our bird looked like a female Parula with a white stripe over each eye, a large elongated black area on the cheeks, several spots of black on the sides of the chest, and the yellow below confined to the chin, throat, and upper breast, fitting perfectly the description and figure by Sutton of the type female Sutton's Warbler in the May–June, 1945, issue of Audubon Magazine.—JACKSON M. ABBOTT, *The Engineer School, Fort Belvoir, Virginia.*

An albino Chipping Sparrow.—On June 25, 1947, Mr. Herman F. Lame, of the Westchester Apartments, Washington, D. C., phoned me that he had picked up a small white sparrow on the spacious lawns of the apartment house. Many verbal descriptions of birds seen are unsatisfactory, and this one was not the exception. Nevertheless, my curiosity was aroused and I went to the home of Mr. Lame expecting to see some excaped cage bird. The bird, which he had placed in his roof garden, was one of the Fringillidae, and appeared to be totally albinistic. As we stood watching, a Chipping Sparrow (*Spizella passerina*) flew down and fed the young bird, thereby establishing the species. Later I had an opportunity to take the bird in the hand and saw, on close examination, that it was an undoubted Chipping Sparrow, and totally albinistic.—MALCOLM DAVIS, *National Zoological Park, Washington, D. C.*

The Golden Plover in south-central Florida.—The Golden Plover, (*Pluvialis d. dominica*) is listed in Arthur H. Howell's 'Florida bird-life' (page 222) as "A very rare or accidental migrant." It would seem, therefore, that the following is of more than ordinary interest. Examination of Howell's account reveals that the last example was seen by Herbert L. Stoddard at Lake Jackson, north Florida, April 7, 1928, nineteen years ago. Limited facilities available to the writer at his present location at Okeechobee, make it impossible for further perusal of the literature, but at any rate, it is of interest to know that the Golden Plover has again appeared in the spring migration, this time, a considerable distance south of Stoddard's territory.

On the afternoon of March 26, 1947, about five miles west of Brighton, Highlands County, a bird was watched for as long as we wished, by Messrs. Richard H. Pough, John Bull and the writer, together with Mrs. Bull, Mrs. Sprunt, and Miss Constance Bancroft of Lakeville, Connecticut. Recent heavy rains had flooded the Kissimmee Prairie area, and drawn many shore-birds to shallow ponds. While we were watching a small flock of Pectoral Sandpipers (*Pisobia melanotos*) another shore-bird flew in, and had concentrated upon it a veritable battery of binoculars—7, 8, 9 and 16-power!! The bird was a Golden Plover. It was watched at a range of about fifty yards, and after complete study was attained, efforts were made to induce it to take wing, to no avail! Passing cars of motorists must have thought that the antics indulged in were the result of sheer lunacy!

Apparently, this species has been taken but three times in Florida—by Atkins at Punta Rassa, and Hoyt at Miakka, in 1889, 1900 and 1901, respectively (Howell). The individual here recorded was observed about 23 miles west of Okeechobee.—ALEXANDER SPRUNT, JR., *National Audubon Society, Charleston, South Carolina.*

Birds observed in April along the Colorado River from Hite to Lee's Ferry.—Opportunity was recently afforded the writer of accompanying a party down Glen Canyon of the Colorado River. The trip started at Hite, Utah, on April 13, 1947, and terminated at Lee's Ferry, Arizona, on April 17. The distance was 162 miles. Members of the group in addition to the writer were Milton Rees and Alf Olson of Idaho Falls, Idaho, and Emil Johnson of San Diego, California. While the four of us navigated this quiet stretch of the river, Clifton Greenhalgh and John Bushman drove the car and trailer around to Lee's Ferry. Two boats, each powered with small motors, were used. Camps were made on the river banks at dusk and departures were made early the following morning. Little time consequently was available for observation, let alone collecting of land birds. On the river, the noise of the motors disturbed the water birds somewhat so that only two birds were collected, a Lesser Scaup Duck and a Franklin's Gull, both of which were prepared as study skins. Yet by the use of field glasses, identifications were made with certainty for every species listed in this paper.

The region traversed is so inaccessible to the ornithologist and so little known faunally that it seems worth while to record the data gathered, meagre though they are. Boat trips through Glen Canyon and along a companion route down the San Juan from Mexico Hat to its junction with the Colorado and thence to Lee's Ferry are increasing in number each year, and these notes may serve as an indication to people making these trips, and at the same time interested in birds, as to just what may be expected in the way of bird life enroute. Furthermore, a dam may be constructed in the future somewhere along the lower portion of Glen Canyon which would greatly alter the environmental situation there.

In April the water level of the Colorado is relatively low. A channel wends its way along marginal areas of the river bed or passes back and forth from side to side,

leaving large areas of shallow water and numerous exposed sand bars suitable for water birds to loaf. Indeed, most of those seen were resting until we approached and disturbed them. Near the mouths of tributary streams and commonly along the edges of the river were sand and gravel bars of varying extent clothed with willows and occasional cottonwoods. In the more open portions of the canyon there was benchland covered with sage, rabbit brush, squawbush, scrub oak or dense growths of annuals. Here several kinds of land birds were found. The ever-present cliffs and rocky canyon walls afforded yet another habitat.

While many of the water birds observed were doubtless in migration when disturbed, they did not as a rule head upstream but rather would retreat downstream ahead of us. After two or three such moves they would take a position on the far shore as we passed or would fly upstream.

Although the number of water birds that we saw along the river was not indicative of any wave of migration, nevertheless the Colorado and Green rivers along their 2000-mile length may serve as a route followed by many water birds in their migrations. Grinnell (Univ. Calif. Publ. Zool., 12: 51–294, 1914) has discussed the birds of the lower Colorado River. Numerous species have been noted on the river in the depths of Grand Canyon (Grater, Nat. Hist. Bull., Grand Canyon Nat. Hist. Ass'n, No. 8: 1–55, 1937). Woodbury (Bull. Univ. Utah, 35: 1–160, 1945) has recorded information for the lower portion of Glen Canyon. Twomey (Ann. Carnegie Mus., 28: 341–390, 1942) found a number of migrants along the Green River in the Uinta Basin of northeastern Utah. The observations of the writer fill in yet another stretch of the river system although overlapping in part the portion traversed by Woodbury.

Listed beyond in systematic order are the species of birds seen along Glen Canyon or in small tributary canyons. Topographic sheets A to K of the U. S. Geological Survey, of the plan and profile of the Colorado River, Lee's Ferry, Arizona, to mouth of Green River, Utah, were used to ascertain exact localities where the birds were observed. Mile intervals upstream from Lee's Ferry are indicated on these maps and have been used to designate the points of bird observations, supplemented by the location of tributary canyons.

Great Blue Heron, *Ardea herodias*.—This species was the water bird most frequently encountered en route. Doubtless some of the individuals were migrants, yet herons of this kind probably nest in the cottonwoods along the river. The first individual was seen at Mile 158 (four miles blow Hite) on April 13 near the mouth of Fourmile Creek. A pair was found that same day at Mile 148½, near the mouth of Ticaboo Canyon. On April 14, three were seen at Moki Bar, 127½ miles. They circled around us showing reluctance to leave the site. A lone individual was seen at Mile 95. It flew downstream and perched on a rock high up on the opposite bank until we passed, whereupon it flew back upstream to the place where first seen. On April 16, at the mouth of Aztec Creek, 68½ miles, a lone heron was observed, and another at Mile 56 near the mouth of Rock Creek. Near the mouth of Last Chance Creek, 49½ miles, four were seen this same day. One of these caught a fish about eight inches long, seemingly a catfish, and flew with it crosswise in its bill to an exposed rock where it landed and waited for us to pass. On our last day, April 17, single Great Blue Herons were seen at Mile 21, Mile 6 and Mile 3.

Snowy Egret, *Leucophoyx thula*.—A lone individual was standing on a mud bar at Mile 60 on April 16. Eight were seen at Mile 11 on April 17. They flew downstream, landed, flew again and landed, and finally, the third time they were disturbed, crossed to the opposite shore where they remained as we passed.

BLACK-CROWNED NIGHT HERON *Nycticorax nycticorax*.—Two were seen on April 16, at the Crossing of the Fathers, near the mouth of Kane Creek, Mile 40½, and on April 17 another pair at Mile 17 near the mouth of Wahweap Creek.

WHITE-FACED GLOSSY IBIS, *Plegadis guarauna*.—Three were seen at 122 miles, April 14, standing on a sandbar.

CANADA GOOSE, *Branta canadensis*.—At the mouth of Ticaboo Creek, 148 miles, a single individual passed us on April 13, flying upstream. The following day, at 111 miles, a single example flew over us, also headed downstream, but circled and continued upstream.

PINTAIL, *Anas acuta*.—A pair was observed in flight going upstream near the mouth of Ticaboo Canyon, 148½ miles, on April 13. Two pairs were seen on April 14 at 122 miles loafing in consort with Shovellers, a Baldpate and a Green-winged Teal. Six Pintails flew past us headed upstream, April 14, near Hole-in-Rock Creek, Mile 84.

GREEN-WINGED TEAL, *Anas crecca*.—A single male was among a flock of ducks consisting of Pintails, Shovellers and a Baldpate on a bar at Mile 122, April 14.

BLUE-WINGED TEAL, *Anas discors*.—Near Klondike Bar, Mile 65, a pair was seen April 16.

CINNAMON TEAL, *Anas cyanoptera*.—A pair was seen near the mouth of Wahweap Creek, Mile 17, on April 17.

SHOVELLER, *Spatula clypeata*.—At Moki Bar, 127 miles, there were three pairs on April 14. A few miles downstream, at 122, two more pairs were resting with Pintails, a Baldpate and a Green-winged Teal.

GADWALL, *Chaulelasmus streperus*.—A pair was noted near Hole-in-Rock Creek, Mile 84, on April 14. Five were resting on a mudbank at the mouth of the San Juan River, Mile 78 the same day. The last two seen were near the mouth of Wahweap Creek, Mile 17 on April 17.

BALDPATE, *Mareca americana*.—Only one was seen, at Mile 122, in a flock of Pintails, Shovellers and a Green-winged Teal, April 14.

CANVAS-BACK, *Aythya valisineria*.—At Moki Bar, 127½ miles a pair was seen and a half mile downstream a female was resting with three pairs of Shovellers on April 14. On April 16, at Mile 59½, near the mouth of Last Chance Creek, there were three females.

LESSER SCAUP DUCK, *Aythya affinis*.—At the mouth of Fourmile Creek, 158 miles, two females were seen and one collected on April 13. Two additional females were seen a few hours later at the mouth of Ticaboo Canyon, 148 miles.

AMERICAN GOLDEN-EYE, *Bucephala clangula*.—Wherever ducks of this species occurred they were in small flocks, and hence were more numerous than other ducks. All were seen on April 16. At the Crossing of the Fathers, near the mouth of Kane Creek, 40½ miles, twelve were seen. They headed downstream. At Mile 36, twelve were seen, probably the same flock. This time they flew upstream. At Mile 31, a flock of 16 was seen which took off upstream.

PRAIRIE FALCON, *Falco mexicanus*.—A lone individual was seen soaring across the face of a cliff just below Moki Bar, Mile 127, on the morning of April 14. The same day a pair was seen toward evening at Mile 88 near the mouth of the Escalante River. One landed on a ledge high on the vertical cliff. On April 15, en route to Rainbow Bridge, a pair was seen near the junction of Bridge and Aztec canyons. This locality was about one airline mile east of the point where Aztec Canyon enters the Colorado River at 68½ miles. One or both members of the pair repeatedly landed on an exposed promontory, suggesting an eyrie.

PIGEON HAWK, *Falco columbarius*.—A lone bird was in flight upstream along the river near the mouth of Warm Spring Creek, 136 miles, April 13.

RING-BILLED GULL, *Larus delawarensis*.—On April 16, three were seen at Mile 49 near the mouth of Last Chance Creek. They headed downstream, and about an hour and a half later three were seen, possibly the same three, at 40½ miles near the Crossing of the Fathers, at the mouth of Kane Creek. Upstream, a quarter of a mile from Lee's Ferry, a lone crippled gull was seen on the far side of the river on April 17.

FRANKLIN'S GULL, *Larus pipixcan*.—Near the mouth of Ticaboo Canyon, 148 miles, two were seen on April 13, and one, a male, was collected.

BROAD-TAILED HUMMINGBIRD, *Selasphorus platycercus*.—One male was seen sipping from the blossom of the scarlet bugler at the mouth of Aztec Canyon, 68½ miles, April 15.

SAY'S PHOEBE, *Sayornis saya*.—One was noted at the Chaffin Ranch near the mouth of Trachyte Canyon just below Hite, on April 13. Near the mouth of Ticaboo Canyon, 148 miles, one was observed to fly across the river from the west to the east bank this same day.

VIOLET-GREEN SWALLOW, *Tachycineta thalassina*.—Only two birds of this relatively common species were seen, both skimming over the clear water of Aztec Creek, near its mouth at Mile 68½ on April 15.

AMERICAN RAVEN, *Corvus corax*.—One was seen in flight along the narrow canyon gorge at Mile 31 on April 16.

CALIFORNIA JAY, *Aphelocoma coerulescens*.—One was seen and heard in the dense streamside growth of willows and cottonwoods at Hite on the morning of April 13.

HOUSE WREN, *Troglodytes aëdon*.—One was seen in the willow thicket along the stream at the mouth of Smith Fork, 132 miles, April 14.

CANYON WREN, *Catherpes mexicanus*.—One was seen and heard at Hidden Passage Canyon, Mile 76, the morning of April 15. At the mouth of Aztec Canyon, 68½ miles, one was heard April 15 and 16. Another was heard at Lee's Ferry, April 17.

ROCK WREN, *Salpinctes obsoletus*.—Seen at Lee's Ferry, April 17.

RUBY-CROWNED KINGLET, *Regulus calendula*.—A migrant was found at Lee's Ferry, April 17.

LUCY'S WARBLER, *Vermivora luciae*.—One was seen at Lee's Ferry, April 17.

YELLOW WARBLER, *Dendroica petechia*.—An early migrant was seen at the mouth of Smith Fork, 132 miles, April 14.

AUDUBON'S WARBLER, *Dendroica auduboni*.—One was seen at Lee's Ferry, April 17.

RED-WING, *Agelaius phoeniceus*.—A small flock of eight flew over the willows near our camp at mouth of Smith Fork, 132 miles, on the morning of April 14. Two were en route along the sandbars two days later at the mouth of Aztec Creek, 68½ miles.

HOUSE FINCH, *Carpodacus mexicanus*.—These finches were abundant at the mouth of Smith Fork, 132 miles, April 14. They were common at the mouth of Aztec Canyon, 68½ miles, April 15, and again at Lee's Ferry April 17.

PALE GOLDFINCH, *Spinus tristis*.—A flock of 45 or more was frequenting the open country at the mouth of Smith Fork, April 14.

SPURRED TOWHEE, *Pipilo maculatus*.—One was seen in a scrub oak thicket at the mouth of Smith Fork, 132 miles, April 14.

OREGON JUNCO, *Junco oreganus*.—A few of these winter visitants or migrants were found April 13, at Hite, 162 miles.

WHITE-CROWNED SPARROW, *Zonotrichia leucophrys*.—A few of these transients were seen at Hite, April 13, and again at Lee's Ferry, April 17.—WILLIAM H. BEHLE, *Department of Zoology, University of Utah, Salt Lake, City Utah.*

Sight record of the Man-o'-war-bird in Massachusetts.—While banding marsh birds at the Austin Ornithological Research Station, North Eastham, Cape Cod, Massachusetts, on June 10, 1936, I watched the approach of a bird which at first glance I took to be an eagle or hawk. It glided nearer, about three hundred feet high, occasionally soaring in wide circles, and then descended to pass directly overhead only about one hundred feet above me. Its long, angular, pointed wings led me to believe that it was a Man-o'-war-bird, and then it opened its long tail in the scissor action that is characteristic of this species. The sky was overcast, following a southeasterly gale, and there was still a moderate wind. I could detect no conspicuous light areas in the bird's plumage, which appeared to be entirely dark gray. I was not then familiar with this species, but a few months later had opportunity to see hundreds of these birds in Guatemala, and verified my conclusion as to the identity of the Cape Cod individual.

Forbush describes the Man-o'-war-bird in "The Birds of Massachusetts and Other New England States," 1: 171, as "a late summer and fall wanderer to this section, driven here probably by severe southeasterly gales," but cites only one previous record in Massachusetts, dated October 17, 1893, at New Bedford. He also records two specimens from Maine, dated 1871 and October 19, 1893, respectively, and one from Connecticut, dated 1859. Elizabeth Dickens reported that one was shot on Block Island, Rhode Island, on November 16, 1932 (Auk 51: 247, 1934), and R. W. Smith mentions three records from Nova Scotia (Auk 55: 548, 1935).—FRED MALLERY PACKARD, *National Parks Association, Washington, D. C.*

Cerulean Warbler in the District of Columbia, Maryland, and Virginia.—Kolb, Auk, 60: 275–276, 1943, comments at some length on the status of the Cerulean Warbler (*Dendroica cerulea*) in the Baltimore and Washington regions. I would like to place on record my observations of this species since 1931, which would seem to indicate that it is not too rare in the vicinity of Washington.

1934. A male, first seen May 14 in the north end of Rock Creek Park, D. C., was under observation until August 26, when it was last heard singing by H. G. Deignan, H. H. Collins, Jr., and the writer. It was seen frequently during May and June by numerous members of the local Audubon Society. He established his territory in fairly heavy woods composed chiefly of sycamore (*Platanus*), tulip tree (*Liriodendron tulipifera*), maple (*Acer rubrum*), and box-elder (*Acer negundo*), through which flowed Rock Creek. A great deal of his time was spent in the higher branches of the sycamores. He ranged on either side of the D. C.-Maryland line, just east of Beach Drive. He was detected on the Maryland side June 15, singing close to a nest, about 60 feet up in a sycamore, which proved later to belong to the Parula Warbler, (*Parula americana*). No female Cerulean was ever seen.

One was seen May 22 at Great Falls, Maryland.

1936. One was seen May 16 on the Appalachian Trail, near Mt. Weather, Virginia.

1937. One was seen May 2 at Elizabeth Furnace, George Washington National Forest, Virginia. One was seen May 23 long Piscataway Creek, near Picsataway, Maryland.

1938. One was heard singing May 13 near Pierce Mill, Rock Creek Park, D. C. May 29, while walking south along the Chesapeake and Ohio Canal towpath, from Seneca to Great Falls, Maryland, a distance of about 11 miles, I heard five and saw another singing male.

1939. One was seen at the foot of the Big Devils Stairs, Shenandoah National Park, Virginia, five miles west of (Little) Washington, May 14.

1940. One was seen June 2 at Great Falls, Virginia.—W. H. Ball, *4311 W. Knox Road, College Park, Maryland.*

***Pinicola enucleator eschatosus* at Madison, Wisconsin.**—During the winter of 1946–1947, there was a considerable influx of Pine Grosbeaks that reached southern Wisconsin. This was due in part to a better than normal crop of conifer seeds. On October 27, 1946, C. L. Harrington, State Conservation Department, gave me the following information on seed production: *Pinus strobus*, abundant; *Pinus banksiana*, medium; *Pinus resinosa*, poor; *Picea canadensis*, poor, but good in the Upper Peninsula of Michigan.

On March 2, 1947, I encountered a lone pair of birds indulging in what was obviously a courtship flight. The female that was collected was identified as the Newfoundland form, *eschatosus*. Dr. J. Van Tyne kindly examined the skin and wrote: "I agree with you that it is an example of *eschatosus*. The wing, tail, and weight are on the large end of the permissible size range, but the bill is definitely of the *eschatosus* type." The weight was 61.7 grams. Van Tyne (Auk, 51: 52–30, 1934) found the maximum weight of *eschatosus* to be 61.2 grams, and the minimum for *leucura*, 70 grams.

This form has not been previously reported for Wisconsin, and this record thus marks a further extension of its range (*Cf.* Van Tyne, *loc. cit.*).—A. W. Schorger, *168 N. Prospect Ave., Madison, Wisconsin.*

Reddish Egret in central Texas.—On August 1, 1943, I saw an immature Reddish Egret (*Dichromanassa rufescens*) in a marsh at Camp Barkeley, near Abilene, in central Texas. It was associated with a small group of adult and immature Yellow-crowned Night Herons.

The Reddish Egret does not seem to display the tendency toward postbreeding northward wandering which is so typical of many of the southern herons. There are, therefore, very few published inland records for this species. The only non-coastal records I have been able to locate are three cited by Wells W. Cooke (Distribution and Migration of North American Herons and their Allies, U. S. Dept. Agr. Biol. Surv. Bull., No. 45: 50, 1913). Several Reddish Egrets were seen in August, 1875, near Cairo, Illinois, one was collected near Colorado Springs, Colorado, and one near Golden, Colorado (Cooke gives no dates for the latter two records).

I wish to thank Dr. Herbert Friedmann of the U. S. National Museum, who kindly checked his distribution files for Reddish Egret records.—Kenneth C. Parkes, *Laboratory of Ornithology, Cornell University, Ithaca, New York.*

Late nesting of Ruby-throated Hummingbird at Mt. Lake, Virginia.—Ordinarily in a mountainous country it would seem reasonable to assume a shorter breeding season with less likelihood of late broods at the higher altitudes and more probability of late nests in the valleys. On reaching the University of Virginia Mt. Lake Biological Station (altitude 3800 feet) in Giles County, Virginia, July 20, 1946, it appeared that nesting operations for the season were about to close. In the early morning about the station grounds Rose-breasted Grosbeaks and Robins sang regularly for a few days. For a week or ten days three or four hummingbirds could be seen perching or buzzing with their peculiar squeaky twitter about several oak trees near the parking area, and in the early or late hours of the day a family of Yellow-bellied Sapsuckers worked over the same general group of oaks. The morning of July 22 a family of Chestnut-sided Warblers left its nest and was encountered the following day in the same place. The termination of these observations before or

with the close of July indicated the conclusion of another nesting season on the mountain top.

However, on August 8, 1946, Dr. George M. Lawson of the University staff told me of finding what he thought was a new hummingbird nest in an oak tree near the spring-fed swimming pool. The nest was shown me the next day near the tip of one of the branches and about fifteen feet above the ground, but no birds were seen. On August 12, the female was on the nest incubating. August 20, the nest appeared deserted, but a final visit on August 23 before I left the station disclosed the beaks of the young pointing up at an angle; their bodies could not be seen.

During the last part of July and the first half of August, the wild bergamot, *Monarda fistulosa*, was found blooming here and there on the mountain as the most conspicuous flower of that season, but by the time the young hummingbirds were observed on August 23 even this, the last of the conspicuous summer flowers, was practically through blooming at the higher altitudes. It would seem as though the food of the young hummers would have to consist largely of small insects obtained primarily from sources other than flowers or else the parents were going several miles to lower levels where the *Monarda* blossoming period was a little more prolonged.

In a paper on the birds breeding in the mountains of Virginia, H. H. Bailey (Auk, 29: 81, 1912) reports the Ruby-throat as abundant but without signs of a second brood. Much of his data was obtained from the Mt. Lake area. Ellison A. Smyth, Jr., in his paper on the birds of Montgomery County, Virginia (Auk, 29: 518, 1912), mentions having records of several nests and gives data on one nest started May 15, incubation commenced June 5, the young nearly fully fledged June 20 and feeding on *Tecoma* blooms June 28. He does not refer to any second or late broods, but says hummingbirds were abundant about the *Tecoma* during July. Blacksburg, the center of his observations, is about eighteen miles south of Mt. Lake.

In the warmer low-country south, Arthur T. Wayne (Birds of South Carolina: 98) says that in the vicinity of Charleston he has taken fresh eggs as early as April 23 but that the greater number of birds breed about May 4. He states that two broods are raised, and of the second, fresh eggs may be found by June 25. And O. E. Bayard, in his paper on the birds breeding in Alachua County, Florida (Auk, 30: 145, 1913), gives the nesting dates there as from May 10 to June 25.

Thus it would seem that an August nesting record of the Ruby-throat from one of the highest mountains of southwestern Virginia is worthy of note.—Thomas Smyth, *Department of Biology, University of Florida, Gainesville, Florida.*

Brewster's Booby collected in the United States.—On September 20, 1946, at 4:30 p. m., while the writer was returning from a refuge patrol trip, an unfamiliar bird was observed resting on the Colorado River about fifty feet north of the trash rack of the All-American Canal Intake at Imperial Dam, Imperial County, on the California side of the river. From a distance, the bird was first mistaken for a crippled cormorant, but on closer approach in the outboard motor boat, it was recognized as a booby. The boat passed within three feet of the bird, which seemingly paid little attention to the intruder. After drifting away and turning the boat about, a second slower run was made to the booby. It was easily stunned with an oar for it made no attempt to fly. The stunned bird was taken to the writer's residence where it succumbed during the night. The booby was not in the vicinity a few hours earlier in the afternoon when the patrol trip was started.

Upon posting, the bird was found to be a male; the stomach was empty; and it appeared to be emaciated with a slight diarrheal condition. The prepared skin was sent to Dr. H. H. T. Jackson and Dr. John W. Aldrich, Fish and Wildlife Service,

National Museum, Washington, D. C., where Dr. Aldrich kindly verified the specimen as a Brewster's Booby, *Sula leucogaster brewsteri*. This is believed to be the first United States record of the Brewster's Booby supported by a specimen.

About ninety airline miles northeast of Imperial Dam, Gale Monson (Brewster's Booby in Arizona, The Auk, 63 [1]: 96, 1946) photographed an immature Brewster's Booby in the Bill Williams arm of Lake Havasu, Havasu National Wildlife Refuge, in Mohave and Yuma counties, Arizona in August, 1943. Grinnell and Miller (Distribution of the Birds of California: 558, 1945) include the Brewster's Booby in their "Supplemental List of Introduced Species and Those of Uncertain Occurrence," and further state:

> " . . . The Brown Booby is much the more likely of these two species to straggle up into California, for it breeds commonly in the Gulf of California. Obviously neither species can yet be added on regular status to the California state list.
>
> Note—The colors of plumage and soft parts in *Sula* are so variable that reliance for identification of species upon anything less than a bird in hand is hazardous. . . . "

Neither Peterson (Field Guide to Western Birds, 1941) nor Hoffmann (Birds of the Pacific States, 1927) includes the Booby in his publication. Swarth (A Distributional List of the Birds of Arizona, 1914) makes no mention of it.

Between 1:30 and 2:30 p. m. on September 8, 1946, Mr. Alfred G. Hess, Yuma, Arizona, observed an unfamiliar brown bird diving for fish with an Osprey in the spillway pool below Laguna Dam (five miles south of Imperial Dam) on the California side. This particular bird repeatedly dived under the surface of the water for fish from a height of fifteen to twenty feet above the water. Mr. Hess, being an amateur bird student, reported his observation of this unknown bird to the Fish and Wildlife Service office at Yuma. This bird may have been a booby, and if such was the case, it would indicate that the booby could have been in the vicinity for twelve or more days before being collected.

Future observations during the summer months may prove the Brewster's Booby to be more common along the Lower Colorado River than suspected. Van Rossem (A Distributional Survey of the Birds of Sonora, Mexico: 33, 1945) states that the Brewster's Booby is common or even abundant in the Gulf, and it has been recorded in México at El Golfo and the mouth of the Colorado River about fifty and seventy airline miles, respectively, south of Imperial Dam.—FRANK B. MCMURRY, *Fish and Wildlife Service, 436 Federal Building, Salt Lake City 1, Utah.*

The Western Lark Sparrow in the Eastern States.—As is now well known, the Eastern Lark Sparrow (*Chondestes grammacus strigatus* Swainson) is a bird of limited range in the states west of the Alleghanies, replaced from the Great Plains westward by the much commoner and more widely ranging *strigatus*, a very distinct subspecies, so much paler in both adult and immature plumages that it is recognizably distinct in life under favorable circumstances. Care and expert knowledge are, however, required, as immature specimens are always paler and duller than adults. In the last two decades particularly, it is curious how frequently the Lark Sparrow occurs in the Atlantic seaboard states, chiefly in August and early September northward. From what follows, it will be seen that the assumption that these birds are all typical *grammacus* is unwarranted, and a reëxamination of specimens of record might be worth while.

On September 12, 1946, a Lark Sparrow flashed across the road at Ipswich, Massachusetts, in front of my car which was immediately stopped. The sparrow obligingly

flew into the road and began to feed in plain sight, to the great satisfaction of my party. After one good look I suspected its identity, and the bird was immediately collected. It proved to be a typical immature female *strigatus*, and I am much obliged to my colleague, J. C. Greenway, Jr., who compared the specimen with me, and concurs in the identification.

In the course of making comparisons, the collection of the Museum of Comparative Zoölogy proved to contain several Lark Sparrows from Florida, a state from which there are now numerous records of the species. An adult male, however, collected by J. W. Atkins at Key West, November 26, 1895, proves to be much nearer *strigatus* than *grammacus*, although another from Key West sent by the same collector is clearly typical *grammacus*. Wetmore has recently recorded an immature female *strigatus* from southeastern North Carolina (Proc. U. S. Nat. Mus., 90: 527, 1941); just as he says, "this stray from the west may be identified at a glance."

Some 20 or more years ago the late Major Allan Brooks visited Grand Menan, New Brunswick in late September and early October, and stayed with Alan Moses. Stopping later at the American Museum of Natural History, New York, he told me of his surprise at collecting a Western Lark Sparrow, having expected the eastern race which C. W. Townsend found at Grand Menan in 1923. I do not know what has become of the specimen or whether he recorded it somewhere, or changed his mind. On October 17, 1936, a large group of us saw at close range an adult Lark Sparrow in the yard of the Coast Guard Station on Morris Island, south of Chatham, Cape Cod. I was convinced at the time this bird was *strigatus*, but the mixed flock of sparrows was frightened away by members of the crew and a dog, and disappeared in the scrub, so that I was unable to substantiate my suspicions.—Ludlow Griscom, *Museum of Comparative Zoölogy, Cambridge, Massachusetts.*

Pine Siskins in northern Florida.—Since the invasion of Pine Siskins (*Spinus pinus*) throughout the eastern seaboard states was rather general during the winter of 1946–1947, it may be well to record a Florida occurrence which may mark the southern limit of the invasion although it is not the first record of the species for the state. Five Siskins were observed feeding in some conifers and on the ground of the auto court, one-half mile north of Orange Park, Clay Co., Florida, on Route 17, on Feb. 7, 1947.—R. L. Weaver, *Chapel Hill, North Carolina.*

Summer Tanager in Cook County, Illinois.—On May 2, 1944, I collected a male Summer Tanager (*Piranga rubra rubra*) at our home in Northfield Township, Cook County, Illinois. The skin is number 757 in my collection.

The only other specimen of this tanager from the Chicago region that has come to my attention is the one mentioned by Henry K. Coale (Auk, 35: 226, 1918) which was taken on May 19, 1917, two miles west of Highland Park in Lake County.—Stephen S. Gregory, Jr., *Box N, Winnetka, Illinois.*

A correction of first fresh-water nesting of Gull-billed Tern in Florida.—In the Auk, 65: 139, 1948, Mr. Donald J. Nicholson, of Orlando, Florida, claims to have discovered the first fresh-water nesting of the Gull-billed Tern (*Gelochelidon nilotica aranea*) in Florida. The date was May 7, 1943.

On reading this note, this writer was astonished by reason of the fact that, in May, 1939, four years previous to the Nicholson record, he had found the Gull-billed Tern nesting in exactly the same spot (Lake Okeechobee) and had recorded that fact in the Auk (57: 251, 1940). Naturally, he wondered why Mr. Nicholson had not consulted the Auk for any possible earlier record than his, and wrote to him, asking that

question. A reply has been received from Mr. Nicholson, who states that, for some years, he did not receive the Auk, and was therefore "unaware of any previous breeding records of this tern for Okeechobee Lake." He followed this statement by saying that, at this time, he was not at all well, and while he regretted exceedingly his precipitancy in making the claim, he requested that this writer make the necessary correction as soon as possible. Hence this item.—ALEXANDER SPRUNT, JR., *National Audubon Society, Charleston 50, South Carolina.*

The Louisiana Heron in Connecticut.—On June 14, 1947, I found an adult Louisiana Heron (*Hydranassa tricolor*) feeding near the mouth of a small stream that forms the boundary line between the towns of Westport and Fairfield, Connecticut. I sat in my car and observed the bird for about five minutes, using a 10 × prism monocular. Later I paced the distance between the position of my car and that of the bird and found it to be about 120 feet.

A Black-crowned Night Heron (*Nycticorax nycticorax*) in adult plumage was near by and gave me opportunity for comparisons of size and build. The slightly smaller size and much more slender build of the Louisiana Heron was very apparent. The bluish-gray upper parts, purplish brown neck and breast, and the abrupt line between the latter and the pure white under parts were all made out clearly. There were, however, no nuptial plumes.

It was a cloudy day, and raining lightly during part of the time that I was observing the bird, but my glass has a coated objective lens which helps greatly under such conditions. Had the day been sunny I should probably not have seen the details so well, for it was morning, and I was looking from west to east. I should have liked to observe the bird for a longer time, but a pedestrian came along the road, and the bird flew off and took refuge in some tall grass.

There have been reports of sight identifications of this bird in Massachusetts (Bulletin of the Massachusetts Audubon Society, 1 [no. 9]: 149, 1917; and 2 [no. 9]: 123, 1918) and it may be that this species is gradually extending its range northward much as the Yellow-crowned Night Heron (*Nyctanassa violacea*) has done.—ARETAS A. SAUNDERS, *Fairfield, Connecticut.*

Wilson's Phalarope in the District of Columbia and Virginia.—Mud-flats created on Columbia Island, D. C., during operations incident to the construction of the Memorial Bridge and the Mt. Vernon Memorial Highway, attracted numerous species of shore-birds. Among those observed was the Wilson's Phalarope (*Steganopus tricolor*), first seen by Mr. and Mrs. William J. Whiting in September, 1930. Three individuals were seen by the Whitings at the same place, September 27. Mr. and Mrs. Leo D. Miner, Mr. and Mrs. Whiting and I saw three on Columbia Island, September 30. At the same place October 2, 1930, in company with Mrs. T. M. Knappen, I collected an immature female. The Whitings saw one at Alexander Island, near Gravelly Point, Va., October 5. While with M. T. Donoho, I secured an immature male at Alexander Island, October 9, 1930. Both of these specimens are in the collection of the U. S. National Museum. These are believed to be the first examples of this species taken in the District of Columbia and Virginia. —W. H. BALL, *4311 W. Knox Road, College Park, Maryland.*

Sharp-tailed Sparrow at Cape Henry, Virginia.—On May 22, 1944, a flock of about fifty of these sparrows was found in a small salt marsh on Little Creek, some six miles up Chesapeake Bay from Cape Henry. Hoping to secure a specimen which would prove the birds to be breeding in that locality, I collected two birds and sent the skins to Alexander Wetmore for identification.

One of them, a male, proved to be the Acadian Sharp-tailed Sparrow (*Ammospiza caudacuta subvirgata*) which had not formerly been reported from Virginia, although it probably is a regular transient. The other bird, also a male, was identified as the recently-described James Bay Sharp-tailed Sparrow (*Ammospiza caudacuta altera*). This is the second record of its appearance in Virginia; Wetmore lists a specimen in the U. S. National Museum taken September 18, 1893, at Four Mile Run, near Alexandria (Auk 61: 132, 1944).

Wetmore comments that the late date for these migrants is interesting, but not unusual, as their breeding grounds in the north were hardly yet open to them.—JOHN H. GREY, JR., *422 Second St., Charlottesville, Virginia.*

A note on the Western Swamp Sparrow (*Melospiza georgiana ericrypta* Oberholser).—Peters and Burleigh (Auk, 62: 567, 1945) claimed that a series of 12 specimens collected by them showed that Newfoundland Swamp Sparrows were *ericrypta*, rather than intermediate between this subspecies and *georgiana*, as believed by Aldrich and Nutt. The C. F. Batchelder Collection in the Museum of Comparative Zoölogy possesses a series of 16 adults and eight juvenals from various localities in western and central Newfoundland. Of the adults, three birds could be lost in a series of typical "western" *ericrypta*, five resemble the lightest extreme of typical *georgiana*, and the balance are at least two-thirds *ericrypta*. While I do not recall any discussion of the juvenal plumage, and this museum possesses no topotypical juvenal *ericrypta*, the eight juvenals from Newfoundland are as distinct from *georgiana* in the same plumage as are the three extreme adults. There is, then, no question but what the Newfoundland population must be referred to *ericrypta*. I agree with Wetmore (Proc. U. S. Nat. Mus., 88: 573, 1940) that *ericrypta* is a subspecies with well-marked characters; it is indeed surprising that it escaped detection so long.

The nineteenth supplement to the A. O. U. Check-List (Auk, 61: 464, 1944) reports *ericrypta* from Florida, apparently the only Atlantic Coast state of record as yet, but common sense suggests that it will prove to occur in every single one, when collections are examined. In the exceedingly mild and open winter of 1946–1947, Mr. Alan Morgan found two Swamp Sparrows wintering in a little ravine at Wayland, Massachusetts, where a brook, open for a few yards, produced a few square yards of sedgy spring-hole. Aware that Swamp Sparrows did not breed here, and occurred only on migration, I visited this spot on February 3, 1947, and found a Swamp Sparrow which could be approached to eight feet. Struck by its paler coloration and conspicuous white striping above, I had to retire a bit before collecting it with No. 44 dust shot. It proved to resemble those Newfoundland birds which are about two-thirds *ericrypta*. In the M. C. Z. collections I find two similar specimens, collected in Cambridge, April 26, 1889, and Concord, Massachusetts, May 10, 1886. A fourth specimen collected in Cambridge, April 18, 1888, is unequivocal *ericrypta*. All presumably represent the Newfoundland breeding population.—LUDLOW GRISCOM, *Museum of Comparative Zoölogy, Cambridge, Massachusetts.*

Smooth-billed Ani in Florida.—Early in 1943, I left Clewiston, Florida to enter military service. At that time, I had neither seen nor heard of the ani as a resident of this area. Upon my return in June, 1946, it was one of the first birds to attract my attention. I have taken no specimens but on several occasions have carefully observed the birds at short range with 7× binoculars and a 20× telescope. The ani's habit of turning its head at various angles while perched affords an excellent opportunity to study the bill in detail. No grooves could be seen and I assume it was the Smooth-billed species, *Crotophaga ani*.

Several references to the ani's presence in Florida are contained in The Auk. John B. Semple noted it at Miami Beach, February 24, 1937. Alexander Sprunt, Jr., (Auk, 56: 335, 1939) reports its nesting in Miami during July, 1938.

Inquiries indicate that the ani has been present in the Clewiston area since the spring of 1944. Nests have been reported and on November 18, 1946, in Clewiston, I saw young being fed by adults. On June 29, 1947, I observed a nest and four well-fledged young at Moore Haven, a point eleven miles northwest of Clewiston. This nest was bulky and placed approximately twenty-five feet up in an avocado tree. During my stay, both parents made a number of trips carrying grasshoppers to the young. The young showed considerable attachment to the nest and repeatedly returned to it after being fed.

The anis, since coming to this area, have several times survived sub-freezing weather. The United States Sugar Corporation's records contain the following entries: December 14, 1944—28° F.; February 5, 1947—26° F.

It will be interesting in future years to note the progress this tropical bird can make in extending its range northward into colder areas.—WILLARD E. DILLEY, *Clewiston, Florida.*

Blue-gray Gnatcatcher in Hampshire County, Massachusetts.—If there be anything in the hypothesis which was published nearly ten years ago in 'Birds of the Connecticut Valley in Massachusetts,' by A. C. Bagg and me, that the Blue-gray Gnatcatcher (*Polioptila caerulea*) migrates regularly across southern New England to and from Nova Scotia, I have as yet had no confirmation whatever from that province. Fall migrants have continued to strike the coast of Massachusetts, especially Cape Cod and the tip of Cape Ann, in some numbers, and at Manomet, southeast of Plymouth, Mr. and Mrs. Roger Ernst have for nine years regularly seen them —sometimes three or four together—in late August or September. Spring records in the Boston region and Essex County have also been made in almost every recent year. But Hampshire County in the Connecticut Valley is well north of the hypothetical line of flight from New York City to Boston, and was totally without spring records until May 8, 1939, when a female in Northampton was pointed out to me by Mrs. Seth Wakeman. On April 12, 1941, a male at Arcadia Sanctuary (on the Northampton-Easthampton town-line) was closely studied by Mr. J. Elliott Bliss of Springfield; and on May 13, 1945, another one was seen there by Edwin A. Mason, Superintendent of the sanctuary, and C. Russell Mason, Secretary of the Massachusetts Audubon Society. In autumn, the Gnatcatcher flight seems to be much more scattered in both time and space, and this county has such sight-records as Oct. 16–17, 1930, and Oct. 21, 1934 (*vide* Bagg & Eliot, *op. cit.*: 458); Oct. 22–23, 1944, at Amherst (Mrs. F. C. Pray), and Oct. 14, 1946—a bird caught by Professor Seth Wakeman inside his office.

Then, on the chill, gray morning of April 9, 1947, while I happened to have my binoculars pointed skywards, across their field flew a tiny but long-tailed bird that fortunately alighted in the top of a tall elm. For a few minutes it restlessly fed there, calling four or five times, so that I could positively identify it, though not determine its sex. Then it flew out of sight eastward. The earliness of the date so astonished me, I looked up all the very early records in the Northeast that I could find. In 1929, I discovered, a Gnatcatcher was at Cruger's Island, Dutchess County, N. Y., on March 13 [? Not a misreading of May 13], and another was at Dyker Heights, Brooklyn, N. Y., on April 3. Older records were April 6, 1892, at Stratford, Connecticut, and April 7, 1910, in Prospect Park, Brooklyn, N. Y. Almost matching mine was April 10, 1945, at Leicester, Massachusetts—a bird thoroughly studied by

the late Mrs. Bertha W. Harrison, an experienced, competent observer—and this record was in some measure supported by reports in the Audubon Magazine's 'Season' of Gnatcatchers in Pennsylvania on April 4 and 8 that year. I shall be much interested to hear of any 1947 dates earlier than my April 9.

Astonishment returned to me when on April 17, in exactly the same tall elm (now in full bloom), I perceived another Gnatcatcher which presently descended and sat still long enough for me to see it was a female. I had been to that spot hardly at all in the intervening seven days, and I wonder whether this may not have been the same bird I saw on April 9, for it—*apparently* the same female—continued to be found there by me and by other observers on almost any *morning* visit through May 9! In the late afternoon of April 25 one was seen by Davis H. Crompton in an elm two-fifths of a mile farther east, which I suspect was the same. Then on April 30, very near the regular spot and even closer to where the 1939 bird had been, a *male* was discovered by Mrs. Seth Wakeman, and on May 5 she saw it or another male, while on May 6 I had both male and female under observation at once. To my great disappointment, they paid no attention to each other. The male was not once stimulated to sing. Is not this an additional bit of 'negative evidence' that breeding does *not* occur in Massachusetts but somewhere much farther northeast along this straight-ahead but as yet little recognized migration-route?

I presently learned that a flood of Gnatcatchers greater than any ever previously known was pouring through southern New England. As early as April 11, one was reported in Concord, Massachusetts. On April 17, one was at Rockport, the hypothetical jumping-off place. Here in Hampshire County, a male was in South Hadley on April 29—perhaps the same as one that had been seen in Springfield the day before and as Mrs. Wakeman saw here the *next* day. A female was in North Hadley May 7, a male in Easthampton May 16, and what seem to be three different birds (sex not reported) were observed in Amherst on May 4, 10, and 21—the latest date of which I have heard. South of this county, records were made in Longmeadow on May 11 and 18, and to the north of it a bird was seen in Greenfield on May 16.

If there ever was a summer when Nova Scotia *should* have been searched for nesters, this was it! Where else can the unprecedented multitudes have gone? But I, alas, could not journey thither and seek out corroboration of my hypothesis.—Samuel A. Eliot, Jr., *Smith College, Northampton, Massachusetts.*

Abnormally late occurrence of the Gannet in south Florida.—On June 27, 1947, the writer was returning from the Dry Tortugas to Key West aboard the National Park Service boat 'Noddy.' While we were off Smith Shoal and between it and the Cottrell Key group, about 12 miles northwest of Key West, a large bird was seen on the water directly ahead. As the boat neared it, the bird rose and flew to starboard at a distance of perhaps fifty yards. It was an immature Gannet. Every detail of the plumage was sharp and distinct.

Arthur H. Howell (1932) gives the latest record for Florida as a specimen killed by an airplane near Jacksonville Beach, May 12, 1924. The occurrence of the species well over a month later, and about 500 miles farther south is, indeed, an anomaly. It gave no indication whatever of being injured as it flew strongly. Boobies of two species, Atlantic Blue-faced (*Sula d. dactylatra*) and Brown (*Sula l. leucogaster*) had been observed at the Tortugas for a week, and the conspicuously greater size of the Gannet in comparison was very noticeable.—Alexander Sprunt, Jr., *The Crescent, Charleston 59, South Carolina.*

A hybrid Cinnamon Teal-Blue-winged Teal at the Bear River Migratory Bird Refuge, Utah.—On June 9, 1947, two ducks, at first thought to be two male Cinnamon Teals, were observed swimming together in a small channel near Refuge headquarters. Upon closer observation it was noted that one duck was decidedly off color and had several characteristic markings of the Blue-winged Teal. The bird was collected, and upon closer examination was found to be a Cinnamon Teal-Blue-winged Teal hybrid of male sex. The testes were of normal size for the breeding season.

Some of the distinctive markings of both parents are clearly shown. The specimen has the cresent-shaped white patch in front of the eye and the white flank feathers of the Blue-winged Teal, but with the cheek, chest, breast and side feathers of the dark Cinnamon Teal color. This cross is apparently very unusual, as Kortright states in his book, 'The Ducks, Geese and Swan of North America,' that " . . . even in captivity crosses between the two species are unknown." The skin has been placed in the Refuge collection.—VANEZ T. WILSON AND JOHN B. VAN DEN AKKER, *U. S. Fish and Wildlife Service, Brigham City, Utah.*

A melanistic Ruddy Duck at the Bear River Migratory Bird Refuge, Utah.—On June 8, 1947, a dark Ruddy Duck (*Erismatura jamaicensis*) was noted in company with a normal female Ruddy. An attempt was made to collect both ducks, but only the dark one was secured; the other dived to safety. Upon examination, the duck was found to be black on all upper parts and the usual silvery hue underneath. There was no other color, and no cheek patch was present. Internal examination revealed that the gonads, if present, were only rudimentary. Cloacal examination indicated that the duck was a female. The dark phase suggests a possible correlation between the melanism and the indefinite sex characters, because the sex of most birds is obvious at this time of year. The skin has been placed in the Refuge collection.—RAYMOND M. GLAHN AND JOHN B. VAN DEN AKKER, *U. S. Fish and Wildlife Service, Brigham City, Utah.*

Three new records for British Guiana.—Among the birds collected by the Pinkus-Peberdy Expedition to Mount Roraima in 1938–1939 are three species not previously recorded from British Guiana. Although birds are not concerned with artificial political boundaries, it is believed that publication of these extensions of range is desirable as a means of refining that useful tool, the geographical check-list.

I am indebted to Mr. William H. Phelps of Caracas, Venezuela, in whose collection these specimens are now incorporated, for permission to present the following additions to the fauna of British Guiana.

Procnias averano carnobarba (Cuvier).

♂, January 28, 1939. Adaroo River, British Guiana.

Formerly assigned to the mountains of western British Guiana by various authors on the basis of records for Mount Roraima, Arapu River (= Arabopo River) and the Cotinga River. Clarification of the geographical status, and allocation to Venezuela, of all birds thus far collected on Mount Roraima has been accomplished by Phelps (Bol. Soc. Venez. Cienc. Nat., No. 36: 83–95, 1938). Since the Arabopo and Cotinga rivers flow through Venezuela and Brazil, respectively, this specimen constitutes the first authentic British Guiana record.

Ceratopipra cornuta (Spix).

♀, 2 ♂♂, January 9–29, 1939. Adaroo River, British Guiana.

Erroneously included in the Guiana fauna by earlier writers on the basis of Mount Roraima records.

Hylophilus ochraceiceps ferrugineifrons (Sclater).

♂, October 18, 1938. Paruima Mission, Kamarang River, British Guiana.

The known range of this race formerly extended eastward only to the Río Yuruani, Venezuela.—EMMET R. BLAKE, *Chicago Natural History Museum, Chicago, Illinois.*

Ferruginous Rough-leg in Cook County, Illinois.—I secured a specimen of Ferruginous Rough-leg (*Buteo regalis*) shot in Northfield Township, Cook County, Illinois, on April 21, 1939, from a neighbor of mine. The bird had been wounded in the neck by a twenty-two caliber bullet and was killed at my suggestion. It was a female and now bears the number 736 in my collection.

W. W. Cooke reports the taking of a specimen of this hawk by a Mr. Bolmer at Paris, Illinois, January 19, 1886 (Bird Migration in the Mississippi Valley, 1888). I have been unable to find the record of any other specimen of the Ferruginous Rough-leg taken in Illinois, although there are a few credible sight records.—STEPHEN S. GREGORY, JR., *Box N, Winnetka, Illinois.*

Breeding of the Ring-billed Gull in New York in 1936.—Mr. H. L. Kutz, in The Auk (65: 591, October, 1946) records what he believes to be the first "authentic" instance of the breeding of the Ring-billed Gull (*Larus delawarensis*) in New York state on June 7, 1945. The location he gives is Little Galloo Island, about ten miles from Henderson Harbor, Jefferson County. I found this species breeding in this region in the summer of 1936. The facts are published in Roosevelt Wildlife Bulletin, 7 (no. 2): 134–135, October, 1939, and photograph on page 169: " . . . on July 10, 1936, five or six nests containing broken eggs or dead young and one living downy young [Ring-billed Gulls] were found amongst the weeds on Gull Island, in Sackett's Harbor . . .

"Three or four nests, with two eggs each, were found on the little gravelly island, also known as Gull Island, just off the east shore of Galloo Island [a few miles northwest of Little Galloo]. One of the eggs was in process of hatching . . . Adults with young appeared to have bred in a few localities in the St. Lawrence, near Clayton."

Herring Gulls (*Larus argentatus*) were also in the vicinity most of the time so that comparisons between the species were easily made. The finding of two downy young Herring Gulls is mentioned in the same publication.—A. SIDNEY HYDE, *702 Parkman Street, Los Angeles, California.*

RECENT LITERATURE

Allen's laboratory notebook.[1]—This is the fifth edition of this useful notebook which is undoubtedly familiar to many persons through its former editions. It is not a manual, although it contains some textual matter, but is designed to give the student a place to record the results of his studies and observations made in the field and laboratory and in conjunction with other works of reference. It has been brought up to date with regard to the scientific nomenclature adopted in certain places in the keys, check list, and tables. The keys to the orders and families have been expanded to include all North American groups, not only those of the East as formerly. Likewise, some of the outline drawings have been generalized to make them serviceable for either western or eastern species as may be needed, and blank spaces have been left in the field lists where names may be added that are not on the printed roster. The book is thus adaptable to a wider service than the previous editions.—JOHN T. ZIMMER.

West Indian birds.[2]—Mr. Bond has rewritten his earlier 'Birds of the West Indies' (1936) to make it more compact as is desirable in a work intended as a field guide. In any case, the original book is out of print and there was new matter to be included on the basis of the author's investigations and discoveries in the intervening years.

The descriptions of the species are shortened and the citations of the various subspecies found on the different islands are omitted. The general discussions of families and genera are also deleted, but most of the species are given a paragraph or more of individaual remarks on local distribution, habitat, behavior, song, nidification, or other details—all very helpful in a field guide.

Migrants and residents are combined in a single series, which the reviewer finds an improvement over the segregation of the earlier book. The indexes are of the same sort—to local vernacular and to standard common names. A similar index to the scientific names might have been helpful on occasion to an informed reader to whom the technical name might be more familiar than the common one, but its lack is not a serious handicap. The illustrations are those of the earlier book with some interesting additions. The cuts with the darker shading have not all come out so well on the new paper as on the coated stock used in the original book, but most of them have lost little essential detail and their general excellence makes them very helpful in pointing out the features needed for field identification.

The book, like its predecessor, can be thoroughly recommended to anyone visiting the West Indies who wishes to become acquainted with the birds he may meet on his travels, and to local residents with the same desire.—JOHN T. ZIMMER.

British sea birds.[3]—Mr. Gibson-Hill has condensed into the pages of this book a great deal of information about the birds that are quite obviously his favorites and has illustrated his account with a series of fine photographs, also his work. Twenty-four species that breed regularly in the British Isles are treated in detail, with accounts of their appearance in various stages and plumages, their behavior and distribution, and the etymology of their various common names. Some of them, like the

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[1] ALLEN, ARTHUR A. 'Ornithology Laboratory Notebook.' 4to, 4 pr. ll., pp. 1–256, frontisp. (map), 331 figs., August 4, 1947. Comstock Publishing Co., Inc., Ithaca, N. Y. Price, $4.00.

[2] BOND, JAMES. 'Field Guide to Birds of the West Indies.' 16mo., pp. 1–257, 2 pls. (1 col.), figs. 1–211, end-papers (map), 1947. Macmillan Company, New York. Price, $3.75.

[3] GIBSON-HILL, C. A. 'British Sea Birds.' 4to, pp. 1–(144), frontisp. (col.), 48 pls., 42 figs., end-papers, Sept. 25, 1947. H. F. & G. Witherby, Ltd., London. Price, 18 s.

Common Cormorant and the Shag, are discussed more or less together so far as cormorant behavior in general is common to both of them, but their separate peculiarities are none the less pointed out.

A chapter at the close gives the field characters of the species treated in the preceding sections and as many more related or extralimital forms as well. Maps are presented for seventeen of the species giving a generalized picture of their breeding ranges in the British Isles. Twelve British species of lesser importance are listed without full discussions.

Mr. Gibson-Hill has written a very interesting account of these attractive birds, and his excellent illustrations, supplemented by a number of line-cuts, alone would make the volume worth having.—JOHN T. ZIMMER.

Canadian spring.[1]—Wherever Florence and Lee Jaques choose to let their wandering feet (or other means of transportation) take them afield, they are sure to return with a collection of interesting observations and pictures. This time they chose to drive from Lake Manitoba to the Rockies, starting in April and returning in June, and watching the awakening spring as it reached that northern region. Although they were too late to catch the early arrivals of the waterfowl, they were in time to watch the courting behavior of some of these and find the downy young of others that had started nesting earlier.

Their westward route lay across the prairies and sagebrush plains to the mountain passes where snow still covered the roadway, but everywhere there were birds and other wild creatures, spring flowers, interesting landscapes, or experiences amusing or annoying. They are described in a breezy style that does not conceal the keen observations underlying them.

Those familiar with the artistic productions of Mr. Jaques will not need to be told that the illustrations he has supplied of the countryside and its wild life are as full of the spirit of outdoors as the text by Mrs. Jaques. Nature lovers will find enjoyment in both words and pictures.—JOHN T. ZIMMER.

Wild Wings.[2]—Dr. Murray has collected in book form a series of informal sketches previously published from time to time in a young people's paper and (one) in Audubon Magazine. These sketches are versatile and contain the results of some of Dr. Murray's personal observations in a variety of places, reported in an easy style, and interlarded with many historical and literary allusions and comments.

The first section contains a group of observations made around the year near home, and from them the young reader can get a glimpse of the variety of things to be seen and learned at different seasons. The next section carries the reader farther afield—to the Dismal Swamp, the Great Smokies, the Florida Keys, and such interesting places. The third part recounts observations made in a number of European countries, and the last deals with Audubon and with birds of the Old and New Testaments.

Dr. Murray has been a lifelong student of birds and their ways, and he has put into these sketches his sympathetic understanding of nature at home and abroad.—JOHN T. ZIMMER.

Afield with the birds.[3]—In this book, Dr. Saunders has given us an unusually interesting and comprehensive record of his activities and observations in the neighborhood of southern Ontario. Made up of extracts from his journals, it is filled with

[1] JACQUES, FLORENCE PAGE, AND JAQUES, FRANCIS LEE. 'Canadian Spring.' 8vo, pp. XII + 216. 79 figs., end-paper maps, October 1, 1947. Harper and Brothers, New York. Price, $3.50.

[2] MURRAY, JOSEPH JAMES. 'Wild Wings.' 8vo, pp. 1–123, 15 pls., 1947. John Knox Press Richmond, Va. Price, $2.50.

[3] SAUNDERS, RICHARD MERRILL. 'Flashing Wings.' 8vo, pp. X + 388 + 1 leaf (fold.), frontisp. (col.), 36 figs., end-papers, 1947. McClelland and Stewart Ltd., Toronto. Price, $4.50.

a wealth of critical notes on the occurrence and behavior of the birds of the region, made at all seasons for a period of a dozen years or more. One wonders how the writer found time to make his commentaries so complete in view of the time that he undoubtedly spent afield making the observations that are here recorded!

On each excursion, there appeared to be something worthy of note. It may have been a species rare in the locality or a commoner one doing something unusual—like an Alder Flycatcher eating a cherry. Perhaps it was an unusual bird call that eluded identification, or it may have been nothing that could not have been seen on any other day. Whatever it was, the impressions of the moment were put down, and as told they make interesting reading.

An unusual plan is followed in arranging the notes. They are assembled by month and day regardless of the year except when the dates are otherwise duplicated. Thus, the first note in the book is for January 1, 1944; the second, for January 1, 1945; the third, for January 19, 1941. Since they are not concerned with the continuous life history of individual birds, the result has much in its favor, permitting a long-term study of the local bird life by seasons. For example, we learn that January 1, 1944 was snowless and that sixteen birds were seen; that day a year later was marked by a snowstorm, but twenty-nine species were found. It permits a reader who wishes to know what birds he might be likely to find on certain dates to consult the entries for various years and study the chances. Appended tables of spring and fall migration and a reprint of the Brodie Club's Christmas Census record from 1925 to 1945 are a further help in this particular.

The author remarks that his book is one for browsing rather than for consecutive reading, but it is enjoyable either way. Much of its information will be found useful beyond the geographical bounds of southern Ontario. Once read, it may profitably be kept at hand for future consultation. The fine illustrations by Terence M. Shortt and the amusing end-papers by Barbara Worth add greatly to the attractiveness of this excellent book.—JOHN T. ZIMMER.

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NOTES AND NEWS

NUMEROUS requests for ornithological reprints and bird books have recently come to this country from European ornithologists who have lost their entire libraries in consequence of the war. The desire for ornithological literature among these colleagues (bird lovers as well as professional ornithologists) seems to be as great as that for food and clothing. Perhaps you have a dozen or two extra reprints of some of your papers which you could spare. Papers dealing with any aspect of the general biology of birds, particularly life-history studies, are especially welcome. It would be much appreciated if you would mail such reprints to Ernst Mayr, The American Museum of Natural History, Central Park West at 79th Street, New York 24, New York, or to Frank A. Pitelka, Museum of Vertebrate Zoology, Berkeley 4, California. Please mark packages "A. O. U. Relief Material." All reprints so received will be distributed at once among active European bird students.

Word has come of the death of George K. Cherrie, Member, at Newfane, Vermont, on January 20, 1948; of Dr. Leon J. Cole, Member, at Madison, Wisconsin, on February 17, 1948; of Francis Beach White, Member, at Brattleboro, Vermont, on January 16, 1948; of Courtenay Brandreth, Associate, at Ossining, New York, on November 3, 1947; and of R. Bruce Horsfall, Associate, at Long Branch, New Jersey, on March 24, 1948.

OBITUARIES

SAMUEL HENSHAW, American naturalist and writer, and Member of the American Ornithologists' Union, died at Cambridge, Massachusetts, on February 5, 1941. He was born in Boston, Massachusetts, on January 29, 1852. Descendant of an old Boston family, he was a son of Joseph Lyman and Jane Paine Henshaw. He was educated at the Chauncy Hall School and the Boston Latin School. He married Miss Annie Stanwood on April 28, 1886 (died March 12, 1900). In early youth he had become interested in the study of natural history, particularly in entomology, and these interests continued throughout his life. He was actively identified with the Boston Society of Natural History from the beginning of his membership in 1871 down to 1901. During this period he served as a general assistant under the leadership of Professor Alpheus Hyatt from 1876 to 1891, inclusive, and as Secretary and Librarian from 1892 to 1901, inclusive. His duties during those years included considerable general work on various groups of vertebrates and invertebrates, as well as much that was strictly entomological in character; also preparation of material regularly for use of Professor Hyatt, who was at that time science instructor in Lowell Institute. His library experience enabled him in time to attain a wide knowledge of scientific literature, and in later years to make outstanding bibliographical contributions in entomology. His work with the Museum of Comparative Zoölogy at Harvard, succeeding that of Dr. H. A. Hagen, covered the years 1891 to 1927, inclusive. Beginning with part-time assignments in entomology from 1891 to 1898, inclusive, he was Assistant in Entomology and Librarian from 1898 to 1903, inclusive. He was Curator of the Museum from 1903 to 1911, Director from 1911 to 1927, and Director Emeritus from 1927 to 1941. During the years that he was connected with these institutions, he also had extensive experience with both of them in editorial work, serving for a number of years as editor of various of their publications. One of the founders of the Cambridge Entomological Club, he was one of the editors for a long period of its journal 'Psyche.' In each issue of this periodical there also appeared for many years a bibliographical résumé of the current literature in entomology perpared by Henshaw. His memberships in scientific organizations included the American Society of Naturalists and the American Society of Zoologists. He was also a Fellow of the American Academy of Arts and Sciences. He received an honorary degree of Master of Arts from Harvard in 1903. A survey of Henshaw's published works show that his major interests were in Coleoptera, in biographies of scientists, and in scientific bibliography. The principal biographical matter written by him pertained to John Lawrence LeConte, published in 1878; to George Henry Horn, in 1879; to Alpheus Spring Packard, in 1887; to Hermann August Hagen, in 1894; and to Philip Reese Uhler, in 1903. He also published a notable résumé of gypsy moth work in 1892. In addition to the bibliographical material already mentioned, he compiled the 'Bibliography of American Economic Entomology,' parts 1 to 5, covering the years 1860 to 1894, inclusive, published by the U. S. Department of Agriculture in 1890 to 1896, inclusive, a work later continued to the present time by Nathan Banks and Mabel Colcord. Probably his most important single work is the well known 'List of the Coleoptera of America North of Mexico,' published in 1885, with his three supplements of 1887, 1889 and 1895, respectively. This Henshaw 'List' for some 47 years was the standard work on the subject and was to be found on the desk of practically every working Coleopterist in the land, until the publication of the so-called Leng 'List' in 1920. As would be expected, the span of his life, covering so many decades contemporary with one of the significant periods

in the growth and development of American science, enabled him to have among his colleagues many notable personalities. Among these friends were such individuals as Alpheus Hyatt, Alexander Agassiz, Walter Faxon, H. A. Hagen, Samuel H. Scudder, George L. Goodale, Henry P. Walcott and many others. A passionate lover of books, Henshaw gradually accumulated a large and exceedingly valuable library, particularly containing many rarities and other noteworthy material relating to the life and work of Gilbert White of Selborne. His interest in matters bibliographical also was evidenced in his labors over long years in building up collections and in completing sets of scientific serials in the various libraries with which he was connected from time to time. On the whole, the life and career of Samuel Henshaw forms an excellent example of the superfluity of eulogy toward the careers of men of outstanding accomplishment. In this case, his achievements verily speak for themselves. Grateful acknowledgment is gladly made to Dr. L. O. Howard, Nathan Banks, and Robert T. Jackson for information here used pertaining to Henshaw's early life.—J. S. Wade.

Aaron Clark Bagg, an Associate of the American Ornithologists' Union since 1916, died at his home in Holyoke, Massachusetts, on October 19, 1947, after a severe illness of six years' duration. Born in that city on June 6, 1885, the son of Edward Parsons Bagg and Eliza Crane Parsons, he graduated from Hamilton College in 1907 with a Ph.B. degree. Entering the employ of the Parsons Paper Co. in Holyoke, he became successively Secretary, Vice President, and in 1931, President. His business connections were wide and he served as an officer or director in various other commercial concerns. His well-known generosity and willingness to give freely of his own time resulted in his becoming prominent in church activities and civic organizations such as the Y. M. C. A. in which he served overseas in 1918, subsequently becoming President for a four-year period.

Easy-going to the point of permitting himself to be imposed upon, friendly with all, simple and unaffected, his real enjoyment was concentrated in an outdoor life, camping, studying birds, and fishing. Trips to the forests of Maine were frequent, but he had near at hand his own camp in the hills of the Berkshires. He was always ready to drive many miles to investigate any bird some farmer or villager might ask about, and the charm of his personality in contact with these people did much to develop an interest in birds throughout the region. For many years he was a Director of the Massachusetts Audubon Society. Upon his resignation because of illness he was elected an Honorary Vice President. His ornithological publications were confined mainly to natural history and ornithological items for newspaper accounts of local interest to promote a widespread following, an occasional note in 'The Auk,' such as the finding of the nest of the Acadian Chickadee, *Parus hudsonicus littoralis*, in Maine, or the recording of the (Western) Brown Thrasher, *Toxostoma rufum longicauda*, in Oregon, and to supplying data for and financing 'Birds of the Connecticut Valley,' of which he was co-author with Samuel A. Eliot, Jr.

He is survived by his wife, Helen Perrin Moore Bagg, his son Aaron Moore Bagg who is taking an increasingly active interest in ornithology, and two grandchildren.—Wendell Taber.

Ralph Ellis, Jr., a Life Associate of the American Ornithologists' Union, elected in 1924, died in a hotel at Colusa, California, December 17, 1945, in the 38th year of his life. Death overtook him while he was on a duck hunting trip to the Sacramento Valley. He was born at Jericho, near Oyster Bay, Long Island, N. Y., January 15, 1908. As a child he was frail and never enjoyed robust health. As a result, every

effort was made to gratify his wishes concerning anything in which he was interested. At an early age he moved with his parents to Berkeley, California, which became his home for the rest of his life. Here association with the staff of the Museum of Vertebrate Zoology developed an interest in birds and mammals and in collecting specimens.

Ellis published a few notes in 'The Auk' and 'The Condor' but his interest in ornithology was bibliographical rather then literary. He collected a comprehensive library on natural history, rich in exploration and 'Americana.' Personal visits to bookshops in New York and London and possession of ample means enabled him to pick up many rare items, including first editions and books seldom placed on the market. This valuable library he presented to the University of Kansas, at Lawrence, Kansas. His collection of birds and mammals was given to the Museum of Vertebrate Zoology at Berkeley, Calif.—T. S. PALMER.

JOSEPH EDWARD GOULD, an Honorary Life Associate of the American Ornithologists' Union, died at the age of 79, at his home in Norfolk, Virginia, November 3, 1945, after a long illness. Born on St. Simons Island, Georgia, in 1866, he was the youngest child of Horace Bunch and Deborah Abbott Gould and grandson of James Gould, who moved from Massachusetts to settle on the island one hundred and fifty years ago. Throughout his life, he was a regular visitor to the island where he was later buried.

At the age of sixteen, he entered the shops of the Pennsylvania Railroad at Dennison, Ohio, as an apprentice for mechanical training. From 1889 to 1892 he was a student of mechanical engineering at the Ohio State University. He made railroading a career and served several railroads. In 1905, he went to Norfolk, Virginia, as Superintendent of Motive Power for the Norfolk and Southern Railroad. Later he moved to Florida. In 1922, he retired and returned to Norfolk, Virginia, to make his permanent home.

It was during his student days at Ohio State University that he became actively interested in collecting bird eggs and making trips that were extensive in those times. Few of his records appear to have been published. In Oliver Davie's book, 'Nest and Eggs of North American Birds,' there appears a record of the Harris's Sparrow shot by Mr. Gould near Columbus, Ohio, in April, 1889. Davie states he believes this is the first record of its occurrence in Ohio. In 1906, he found the Swainson's Warbler nesting in Chowan County, North Carolina, a record of which appears in Brimley's 'Birds of North Carolina.'

He was elected an Associate of the American Ornithologists' Union in 1889, and was a charter member of the Virginia Society of Ornithology. Since 1905, he had been a member of St. Bride's Episcopal Church, where he served as a member of the building committee and for some time as a vestryman. He is survived by his widow, Mrs. Jessie Wilcox Gould, and several nephews and nieces.—A. O. ENGLISH.

RUTH EDDY KEYES (Mrs. Charles Frederick Keyes) an Associate of the American Ornithologists' Union, died in Minneapolis, Minnesota, on May 25, 1933. She was born at Ithaca, New York, September 20, 1871, a daughter of Dr. and Mrs. Henry T. Eddy, of Minneapolis, Minnesota. Dr. Eddy, for several years prior to his retirement in 1912, had been the first Dean of the Graduate School of the University of Minnesota. Mrs. Keyes attended the University of Cincinnati and was graduated from Vassar College in 1893. Later she pursued graduate studies at the University of Minnesota. In 1900 she married Charles F. Keyes of Minneapolis. They had three children, (Mrs.) Charlotte K. Clark, of Carmel, California, (Mrs.) Marjory K. Remington, of Glen Ellyn, Ill., and Henry Eddy Keyes, of Atherton, California.

Mrs. Keyes was, for many years, a devoted bird student and a very active member of the Minneapolis Audubon Society. She became an Associate of the A. O. U. in 1922 and retained her membership until her death. The writer never knew Mrs. Keyes personally, but Mrs. Gaylord Davidson, one of her close friends in the Audubon Society, spoke of her in the highest terms of esteem. She remembered her as one of the kindest, most generous, and broad-minded persons she ever knew, never holding grudges against anyone and many times going far beyond the demands of common courtesy in helping less fortunate people. With all her interest in birds she had a wide vision. In the words of Dr. G. P. Conger given at her memorial services: "With her public interests and the breadth of her contacts, . . . she could easily have immersed herself in her past . . . But no, . . . her thought, her life, her work were always reaching out to the things not seen as yet." Mrs. Keyes obviously combined wide interests and considerable abilities with willingness to help which made her one of those persons whom society can ill afford to lose.—W. J. Breckenridge.

Michael Jarden Magee, an Associate of the American Ornithologists' Union since 1919, was born in Philadelphia on October 18, 1862. His grandfather emigrated to the United States from North Ireland. Mr. Magee attended a Quaker school and the Polytechnic Institute of Pennsylvania in Philadelphia. While he was a young man, a visit to Sault Ste. Marie, Michigan, created so great a liking for the place that he determined to remain. Among his business activities were insurance, newspaper publishing, and banking. He was elected President of the Sault Savings Bank in 1923, a position held until his death. On January 22, 1890, he married Mary Emma Miskey of Philadelphia, and the two daughters born of the union survive him. Mr. Magee was one of the pioneers in banding, and approximately 40,000 birds passed through his hands. His 56 contributions to the ornithological literature contain particularly valuable information on the age, sex ratio, and changes in plumage of the Purple Finch and Evening Grosbeak. He died in Sault Ste. Marie on August 22, 1947, and was interred in the Woodlawn Cemetery, Philadelphia.—A. W. Schorger.

Mrs. Ella Maria Ormsby Marshall, a Life Associate of the American Ornithologists' Union, died in her 87th year in Waterbury, Connecticut, October 5, 1943, six days after a fall in which she broke her shoulder and hip. She was born at Hampden, Massachusetts, March 9, 1857. She married Perry Marshall on December 4, 1895, and lived at New Salem, Massachusetts, until his death in 1929, when she moved to Waterbury, Connecticut, to live with her daughter.

Mrs. Marshall was elected an Associate of the Union in 1912. She was much interested in bird protection and in feeding birds. At the annual meeting of the Union in New York in 1919, she exhibited a knitted suet bag which she had made as a substitute for the ordinary suet container made of wire netting, and explained that the bag was intended to keep the birds from freezing their tongues when they tried to obtain food during zero weather.—T. S. Palmer.

George Marion Riddick, an Associate of the American Ornithologists' Union, elected in 1943, died at Los Angeles, California, on December 30, 1944, and was buried beside his wife at Hornersville, Missouri.

Mr. Riddick was born at Stephens, Arkansas, November 2, 1885. He attended Cumberland City Academy at Cumberland City, Tennessee, where he graduated from a four-year scientific course in 1909. From his graduation to July, 1911, I have no record of his activities. However, on this latter date he was appointed to

the position of guard and night clerk at the Tennessee State Prison at Nashville, Tennessee. On October 20, 1913, he transferred to the Tennessee Game and Fish Department and was stationed at Hornbeak, Tennessee, as Deputy Game Warden. On March 1, 1918, he again transferred his activities when he accepted a position in the former U. S. Biological Survey as a U. S. Deputy Game Warden at Hornersville, Missouri. On July 1, 1928, he was promoted to the position of U. S. Game Protector at Little Rock, Arkansas. On July 1, 1934, he was again promoted to the position of U. S. Game Management Agent and transferred to Aberdeen, South Dakota, on July 16, 1934, where he served until transferred to Boise, Idaho, on November 1, 1938; later he was transferred to Portland, Oregon, where, on July 1, 1941, he was promoted to the position of Regional Supervisor of Law Enforcement, a position he held until his death.

George Marion Riddick was blessed with a congenial and pleasant personality. During his many years of law enforcement, especially with the Biological Survey (later the Fish and Wildlife Service), he met and associated with a varied class of people ranging from immature to professional ornithologists and among game violators from wayward boys to professional market hunters. For each and all he had a pleasant smile and a kindly word. He was a firm and faithful law enforcement officer, never shirking his duty no matter how difficult the task might be, but at the same time he never wavered from his kindly disposition.

Mr. Riddick was interested in birds but never published any notes. He was primarily an officer charged with the enforcement of game laws. He loved birds and other wild creatures; furthermore, he loved people. In this way George left a host of friends in many walks of life.—STANLEY G. JEWETT.

LILLIE MAY LAFFERTY STONE (MRS. WITMER STONE) an Associate and a Patron of the American Ornithologists' Union, died in Germantown, Philadelphia, Pennsylvania, August 3, 1940, at the age of 68. She was born in Altoona, Pennsylvania, April 30, 1872, one of the daughters of a large family. After her marriage to Witmer Stone, on August 1, 1904, which was described by Dr. Stone's biographer as "an ideally happy marriage," she made it her chief object of life for 35 years to keep him in the best of health and to aid him in every possible way in his various activities. As Dr. Stone was fond of surf bathing, early every summer they took a house at Cape May, New Jersey, and remained until Labor Day so that he might enjoy the ocean and carry on his investigations on the habits and migration of the birds of this region.

It was Dr. Stone's custom while editing 'The Auk' to make the annual indexes of the volumes during the summer vacations. Entries for the first three numbers of the quarterly journal were prepared, arranged and pasted on sheets. Those for the October number were similarly prepared from galley proof so that only the paging was needed to complete index, and this was added as soon as possible. In this tedious work Mrs. Stone took an active part and did most of the routine of arrangement. She usually accompanied her husband to the annual meetings of the Union, at which he was a regular attendant, and ably assisted him in rounding up a strong local delegation of members so that Philadelphia might be properly represented. Dr. and Mrs. Stone attended the annual meeting of the Union in San Francisco in 1915, took part in the local excursions and visited Yosemite Valley.

Mrs. Stone was elected an Associate in 1920 and because of her liberal bequest to the Union, was made a Patron, posthumously, by the Council. Her memory is preserved in the name of at least one bird, a hummingbird *Lepidopyga lilliae*, from Santa Marta, Colombia.—T. S. PALMER.

THE AUK

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ORGAN OF THE AMERICAN ORNITHOLOGISTS' UNION

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